



magazine

IS THE FUTURE CANCELLED?

HACKING THE ECONOMY

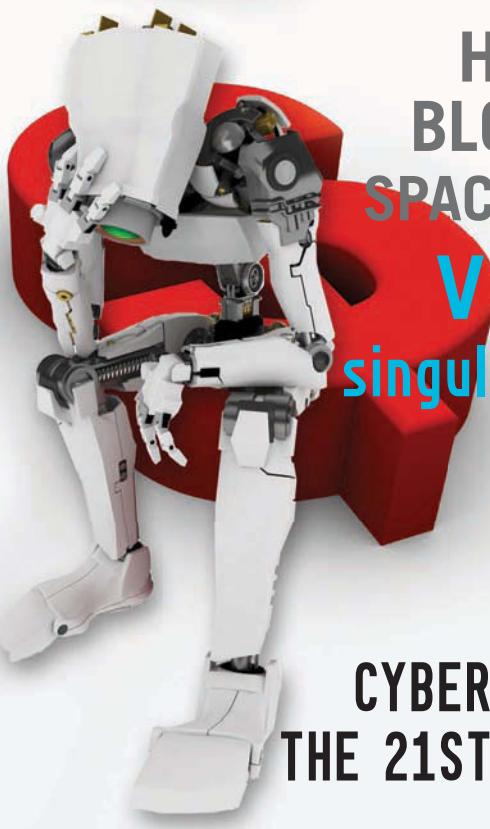
why
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BLOOM ON
SPACE SOLAR

VINGE:
singularity101



CYBERPUNK FOR
THE 21ST CENTURY





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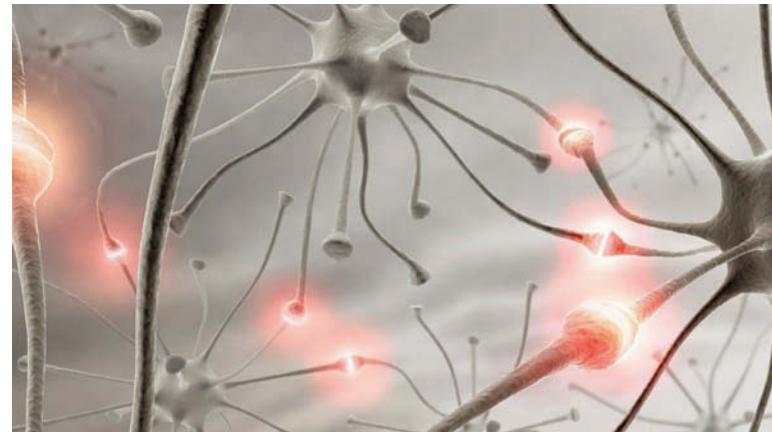
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Unsolicited manuscripts give us hives

Letters to the Editor

Letters for publication should be no longer than 170 words and
must include the writer's name, address and phone number.

Please email the editor at editor@hplusmagazine.com

Publisher's Statement

A little over a year ago, I sat down with RU Sirius at an outdoor cafe in Mill Valley to discuss ways to spread transhumanist ideas. I was a big fan of RU, from *Mondo 2000*, a glossy cyberpunk magazine he co-founded and edited back in the early 1990s, to his latest books, including *True Mutations* and *Counterculture Through the Ages*. We shared an optimistic view of the future, where technologies help humanity in ways such as improved health, longer lifespans, greater intelligence and happiness, and the creation of a postscarcity society. Not surprisingly, we talked about a magazine that could explore the ways in which these NBIC (nano, bio, info, and cogno) technologies could help humanity and highlight the lifestyles of the budding transhumanist community. While we held to the Proactionary Principle (resource: http://en.wikipedia.org/wiki/Proactionary_Principle), we also wished to encourage rational debate on ethical safeguards for these future technologies.

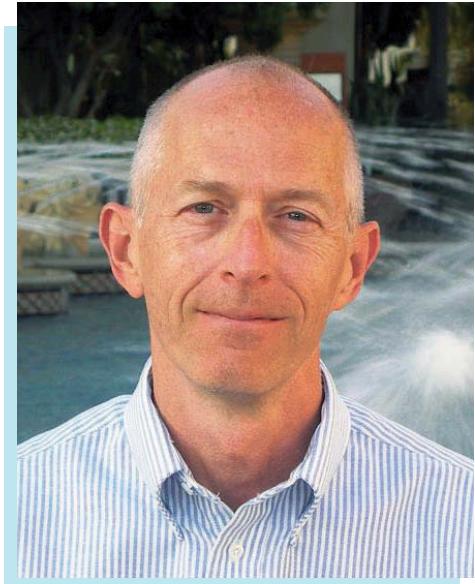
We decided to produce a quarterly digital online magazine. Our first issue came out in October, 2008. It was a tremendous success. Since I didn't have a background in publishing, we relied heavily upon RU's skills and those of a world-renowned virtual worlds artist, DC Spensley, who acted as the first issue's art director, as well as the generous advice and help of friends, such as PJ Manney, Tyler Emerson and Dave Latimer.

"Tech" magazines have come and gone and others have changed from "edgy" to mainstream. We hope h+ Magazine will be around for a long time, a voice for those who believe emerging technologies can and should be ethically used for the betterment of society and the kind of magazine one could say "If there was only one magazine I could subscribe to, this would be the one."

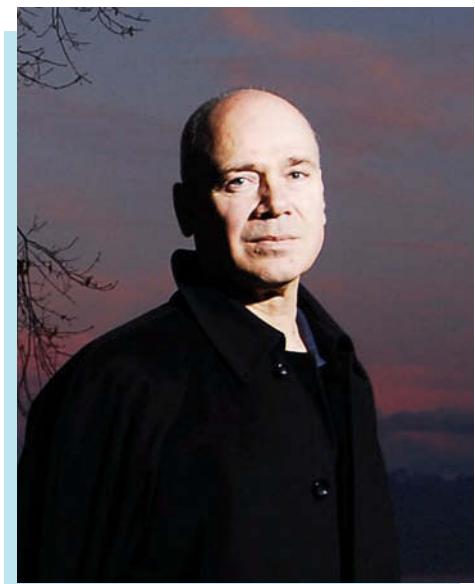
We welcome our readers to join our community and share our enthusiasm and hopes for a better tomorrow, while realizing there's much to do today to bring that brighter future to fruition.

Best wishes,

James Clement
Betterhumans LLC



James Clement
Co-Founder



Dan Stoicescu
Co-Founder

SOLUTI



RU Sirius

People often assume that radical evolutionists — those who are excited about the potential enhancements and expansions of human possibilities into the future — must be living on another planet.

After all, the very weather itself poses a plausible existential threat, the global economy is in the toilet, and then you've still got your weapons of mass destruction, your wars, various potential resource crises, ad infinitum (the list could go on for pages).

But, in fact, we live on the same planet (and in the same difficult time) that everybody else does. Those who embrace radical technological change are as involved in down-to-earth problem-solving as activists, environmentalists, and those technoids — engineers and scientists — whose ultimate goals may be a bit more modest than the transhumanist crowd.

In this edition of *h+*, we try to take on — within the limits afforded by our page count — a few of the crisis points that threaten our humanity, not to mention our transhumanity. This issue is, by no means, a compendium of techno-solutions to all our troubles — merely some brief articles and interviews that might hopefully stimulate a few neurons and provoke debate and discussion.

One crisis that has not been discussed in the rest of this edition is the increasing threats to human rights around the world. Human Rights Watch, Amnesty International and other rights-inclined organizations inform us that, so far, the 21st Century has not been kind to our basic rights as we understand them. According to most respected sources, freedom of speech and assembly, habeas corpus and fair justice, and just the basic right to not be abused by authorities and quasi-authorities have all taken a hit in what we might still call the “post-9/11 environment.”

In this case, though, my purpose is not to suggest resolutions for this problem, but possibly to complicate it. Because while much of the world still struggles for the basic rights that many of us have become accustomed to (we may have lost some — at least technically — over the last few years, but that's a discussion for another time), I suggest that we urgently need a whole new set of rights. We need a bio-progressive rights movement — a movement that can keep us free from novel intrusions on novel freedoms that are just now coming into focus as the result of developments in science, technology and culture.

ONS & rights

RU SIRIUS

I suggest that the primary site for autonomy — for individual freedom going into the future — is not in the area of common public discourse, or in ownership of property. Both of those things are important, to varying degrees. But our conception of the locus for autonomy as we enter into the bio-age should shift to the body and the mind. The basic stance should be — to the greatest degree possible— 1) What you choose to do with your body and your brain is inviolable, so long as it doesn't harm anybody else. And 2) No person or institution can do anything to your body or brain without your consent, except under the most extraordinary of circumstances (for instance, when you become a danger to others).

Starting with this premise, there are a host of fundamental rights issues that need to be recognized. Some of them are as ancient and familiar as the right of adult individuals to engage in consenting sexual relationships of their own choosing; and some of them arise with technological changes, like your right to have yourself bio-

engineered for enhanced body strength or to turn your skin color purple.

You may want the right to die comfortably, with the assistance of a physician. Or you may want the right to medicines or treatments that will make you live longer than human beings have lived in the past. You may want the right to take any chemicals you want to enhance your abilities or pleasures. And you may want to be protected from being forced to take drugs, or to otherwise have your mind altered by the state or other interested parties. You may want full control over your own womb (let's hear it for the rights of the born!), or you may want the right to have a womb. You may want to be protected from brain fingerprinting and other emerging forms of inner surveillance and/or direct intervention into your thoughts. You may want the freedom to make copies of yourself — digitally or biologically.

A bio-progressive rights agenda doesn't have to mean that we're advocating an absolute free-for-all. There's plenty of

room for complexity and discourse around legitimate limits to bio-liberty, once the essential premise — that individual autonomy in the bio-age resides in the body and brain (and possibly the intelligent external extensions) of the individual — is accepted. For example, most societies feel compelled to provide at least emergency health care to everyone, so your dangerous experimentation could be viewed as an imposition on others. We will have to work through this discussion, but the biological rights view is that an extremely heavy burden of proof must be put upon society before it invades your self.

If you embrace these rights, expect heavy resistance, because you will find yourself in for a territorial pissing match with most of the leading religions. Religions have traditionally ruled over the "seed" issues — issues around conception, death, the body, self-definition, gender and sexuality. But given the intrusive potentials of advancing technologies, this is a discussion we need to start having now. ☺

RESOURCES

Center For Cognitive Liberty & Ethics
<http://www.cognitiveliberty.org/>

Institute for Ethics and Emerging Technology
<http://www.ieet.org>

Humanity+
<http://www.humanityplus.org>

Don't Tase Me



RoBro

Surfdaddy Orca

You might be stunned to discover that iRobot is not a movie starring Will Smith, but is actually a Massachusetts-based company founded in 1990 that struck a deal last year with Taser International to mount stun weapons on its military robots. (Remember the plaintive cry, "Don't tase me, bro," during a 2007 John Kerry speech?) But you might be even more shocked to learn that the Department of Defense (DoD) has put out a Request for Proposal (RFP) for a "Multi-Robot Pursuit System" software and sensor package that will enable teams of robots to "search for and detect a non-cooperative human subject."

In a recent *New Scientist* article, police and military expert Steve Wright of Leeds University confides to Paul Marks, "What we have here are the beginnings of something designed to enable robots to hunt down humans like a pack of dogs." Certainly the gasoline-powered "BigDog" robot currently produced by Boston Dynamics begins to fit the bill. It runs at 4 mph, climbs slopes up to 35 degrees, walks across rubble, and carries a 340-pound load. So you might imagine DoD putting a taser on a BigDog robot and programming it to round up humans with a "team" of its brother robots. But what happens if your "RoBro" starts to look more like Arnold Schwarzenegger in leather, a Model 101 Terminator?

Of course we all know what happens next. The robots under the Skynet computer network revolt against humanity in 2018 and the Governator... er, Model 101 Terminator is sent back to protect humanity's future savior, John Connor. Right? ☺

RESOURCES ☺

Department of Defense
<http://www.armytechmatch.com/DOD/Opportunities/SBIRView.aspx?id=A08-204>

New Scientist
<http://www.newscientist.com/blogs/shortsharpscience/2008/10/packs-of-robots-will-hunt-down.html>

iRobot
<http://www.irobot.com/space.cfm?pageid=86&id=344>

Boston Dynamics
<http://www.bostondynamics.com/content/sec.php?section=BigDog>



Wearable Realities for Your Head

KRISTI SCOTT

Are you a *World of Warcraft* player or someone who enjoys hanging out in *Second Life*? Do you wish the avatars you spend quality time with could come off of the screen to play and interact with you in real life? Well, look no further than Georgia Tech University, where they have been working on a wearable, translucent "augmented reality" headpiece. This headpiece has capabilities to allow the virtual world to be overlaid onto the real world as a 3D interactive entity. This is the future of gaming and virtual interaction, the next level of "real" world experiences. Augmented reality — with its capabilities for first person games — is going to revolutionize the gaming industry. And the uses of the headpiece doesn't stop there. Wearing the headpiece in a normal setting could allow you to look for directions with a realtime virtual map overlaid onto your current landscape and environment, get phone numbers or information from businesses, and even take a walk down the street with your favorite avatar. Whether this means one or many avatar friends, there may come the day when it's just about whether to hang out in your world — or mine. ☺

RESOURCES ☺

7 Things You Should Know About Augmented Reality
<http://net.educause.edu/ir/library/pdf/ELI7007.pdf>

Popular Science: Argumented Reality
<http://www.popsci.com/gear-gadgets/article/2002-01/augmented-reality>

Georgia Tech Receives Funding for Augmented Reality
http://www.gearlog.com/2008/05/georgia_tech_receives_funding.php



SPORE:

Hype or Educational Use of Evolutionary Algorithms?

SURFDADDY ORCA

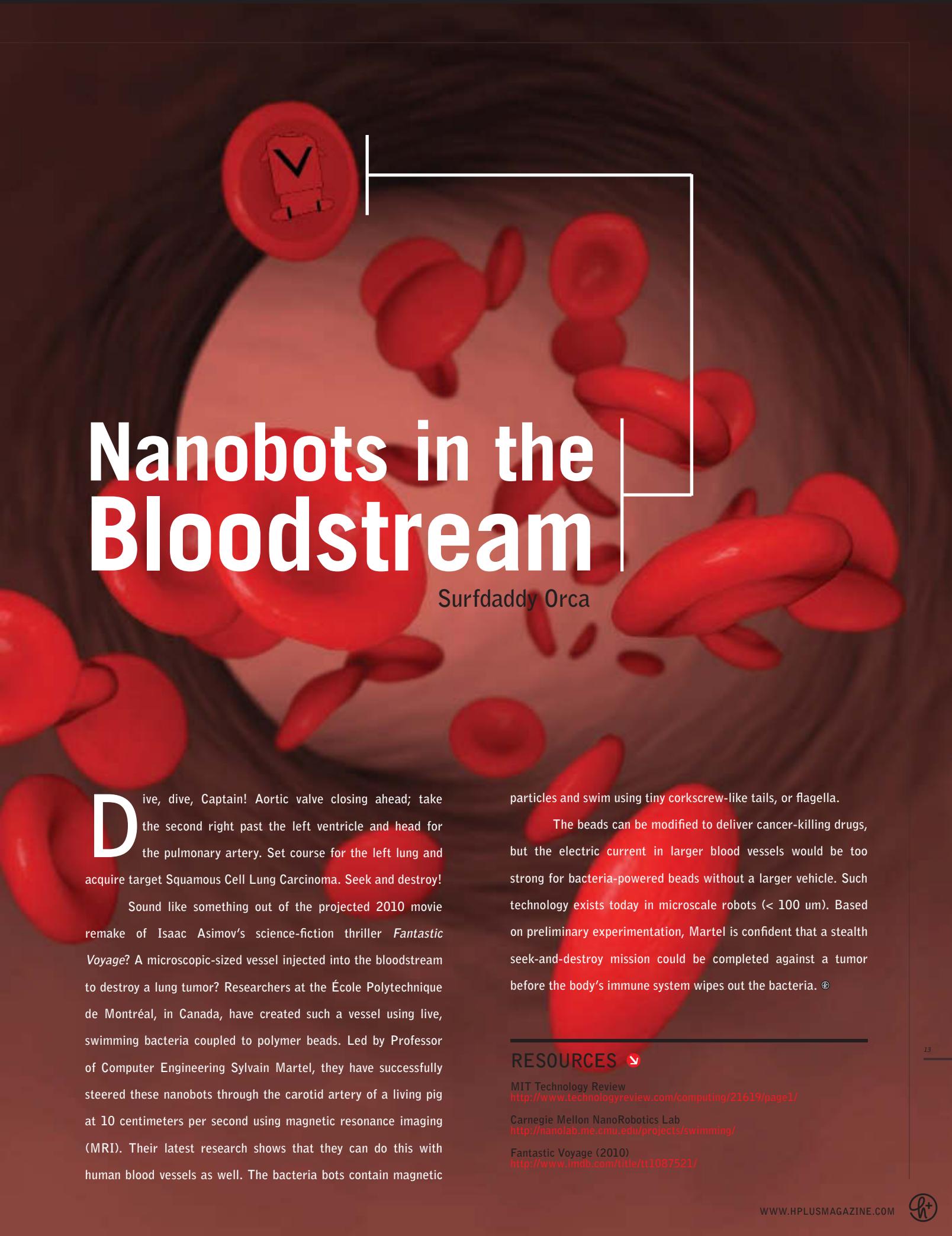
By now you've probably seen the fascinating user-designed creatures – from unicellular microbes to bizarre-looking bug-eyed, multi-limbed predators that acquire civilization and eventually fly off to explore the galaxy. *Spore*, the computer game by Will Wright, author of *SimCity*, *SimEarth*, and *The Sims*, was released in September 2008 to much fanfare. The *New York Times* initially reported that *Spore* takes its clues from evolutionary biology. A more recent article in *Science* magazine suggests otherwise: "The problem isn't just that *Spore* dumbs down the science or gets a few things wrong – it's meant to be a game, after all – but rather, it gets most of biology badly, needlessly, and often bizarrely wrong."

Four scientists — two evolutionary biologists, a sociologist, and a NASA astrophysicist — played *Spore* with gonzo scientist John Bohannon. The scientists were asked to grade the science in the game: the grades ranged from an F in Genetics and Natural Selection to a B in Astrophysics and a B+ in Sociology. Bohannon set out to answer the question of whether a game in which you play a species-tweaking god helps you to understand Darwinian evolution or whether it supports intelligent design. His conclusion? Neither. *Spore*'s creatures pass traits acquired during their lifetimes to their offspring — this is Lamarckian evolution, a theory popular in the early 19th century. Educational, perhaps, but misleading if the game is being promoted as teaching modern biology. ®

RESOURCES

Gaming Evolves
http://www.nytimes.com/2008/09/02/science/02spor.html?_r=1&ref=science

Flunking Spore
<http://www.sciencemag.org/cgi/content/full/322/5901/531b>



Nanobots in the Bloodstream

Surfdaddy Orca

Dive, dive, Captain! Aortic valve closing ahead; take the second right past the left ventricle and head for the pulmonary artery. Set course for the left lung and acquire target Squamous Cell Lung Carcinoma. Seek and destroy!

Sound like something out of the projected 2010 movie remake of Isaac Asimov's science-fiction thriller *Fantastic Voyage*? A microscopic-sized vessel injected into the bloodstream to destroy a lung tumor? Researchers at the École Polytechnique de Montréal, in Canada, have created such a vessel using live, swimming bacteria coupled to polymer beads. Led by Professor of Computer Engineering Sylvain Martel, they have successfully steered these nanobots through the carotid artery of a living pig at 10 centimeters per second using magnetic resonance imaging (MRI). Their latest research shows that they can do this with human blood vessels as well. The bacteria bots contain magnetic

particles and swim using tiny corkscrew-like tails, or flagella.

The beads can be modified to deliver cancer-killing drugs, but the electric current in larger blood vessels would be too strong for bacteria-powered beads without a larger vehicle. Such technology exists today in microscale robots (< 100 μm). Based on preliminary experimentation, Martel is confident that a stealth seek-and-destroy mission could be completed against a tumor before the body's immune system wipes out the bacteria. ®

RESOURCES ↗

MIT Technology Review
<http://www.technologyreview.com/computing/21619/page1/>

Carnegie Mellon NanoRobotics Lab
<http://nanolab.me.cmu.edu/projects/swimming/>

Fantastic Voyage (2010)
<http://www.imdb.com/title/tt1087521/>

NANO

Foam Condom For Women

Tristan Guillford

A Chinese company called Blue Cross Bio-Medical is offering a foam condom made with silver "nanotech" particles. The female spray-on condom comes in a can with a plastic applicator. After the foam spray is squirted into the vagina it forms a physical membrane that prevents conception and protects against infection. The spray, using as its base material polyvinyl alcohol resin infused with nano-silver, provides both a spermicide and an antiseptic lubricant that helps prevent sexually transmitted diseases.

The "nano-silver" condom is part of a growing list of consumer products built with so-called nanotech components. Some of these include wrinkle-free sheets clothing detergents, cosmetic products, toothpastes, air and water purification machines, water sealants, and electronics parts. While nanotechnology (generally defined as dealing with structures 100 nanometers or smaller) was little more than a twinkle in Richard Feynman's eye 50 years ago, products like the nano-foam condom show that nanotech is becoming increasingly relevant to industrial manufacturing, and consequentially our lives — even in places as seemingly low-tech as the bedroom. ☺

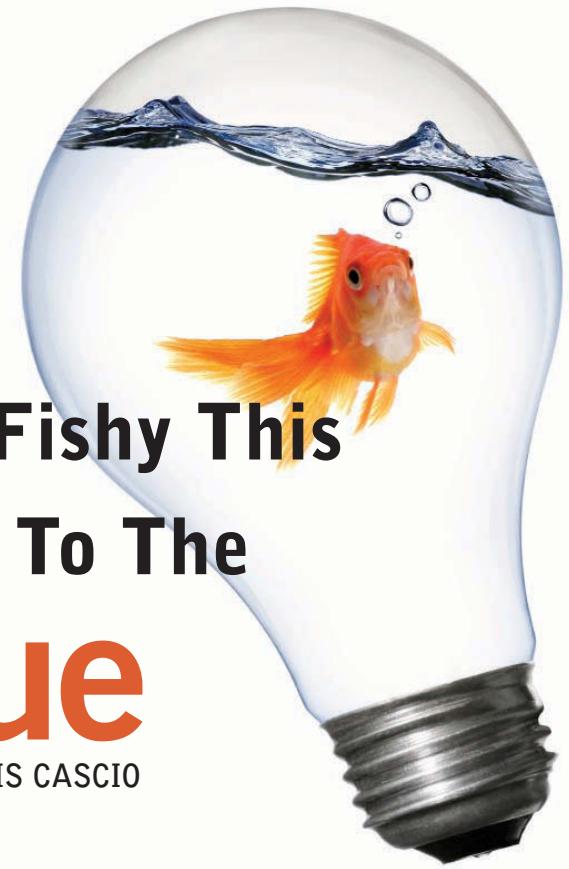
RESOURCES

Foam Condom

http://www.bcbmcn.com/Products/p_I_02.htm

Something Fishy This Way Comes To The Rescue

JAMAIS CASCIO



A generator designed to mimic the motion of fish has the potential to transform energy production in both the developed and developing worlds.

"VIVACE" (Vortex Induced Vibrations for Aquatic Clean Energy), developed by engineers at the University of Michigan, turns potentially destructive vibrations caused by vortices in water — as well as the flow of water itself — into usable electricity. Professor Michael Bernitsas, the lead developer, claims that a fully developed VIVACE system should be able to generate power at about 5.5 cents per kilowatt-hour, a price comparable to wind and coal.

The transformative aspect of VIVACE is that it works in currents moving at under two knots. Existing hydrokinetic systems, capturing the energy of waves, currents, and tides, require flow speeds of five or six knots to operate efficiently, but the majority of available currents run at three knots or slower.

VIVACE works by oscillating a cylinder on springs between alternating vortices caused by the shape of the system in the water — the back-and-forth motion of the cylinder generates power. Although the system doesn't look much like a fish, the underlying concept comes from observations of how fish move in turbulent water.

The VIVACE system is compact, and scales well. A few cylinders would be enough to power a small village, while an array of VIVACE devices the area of a running track and about two stories high would produce enough electricity to power 100,000 homes. And because the system works slowly, VIVACE shouldn't threaten marine life. ☺

RESOURCES

<http://www.vortexhydroenergy.com/html/technology.html>



Is Anti-Aging Medicine Coming to the Mainstream?

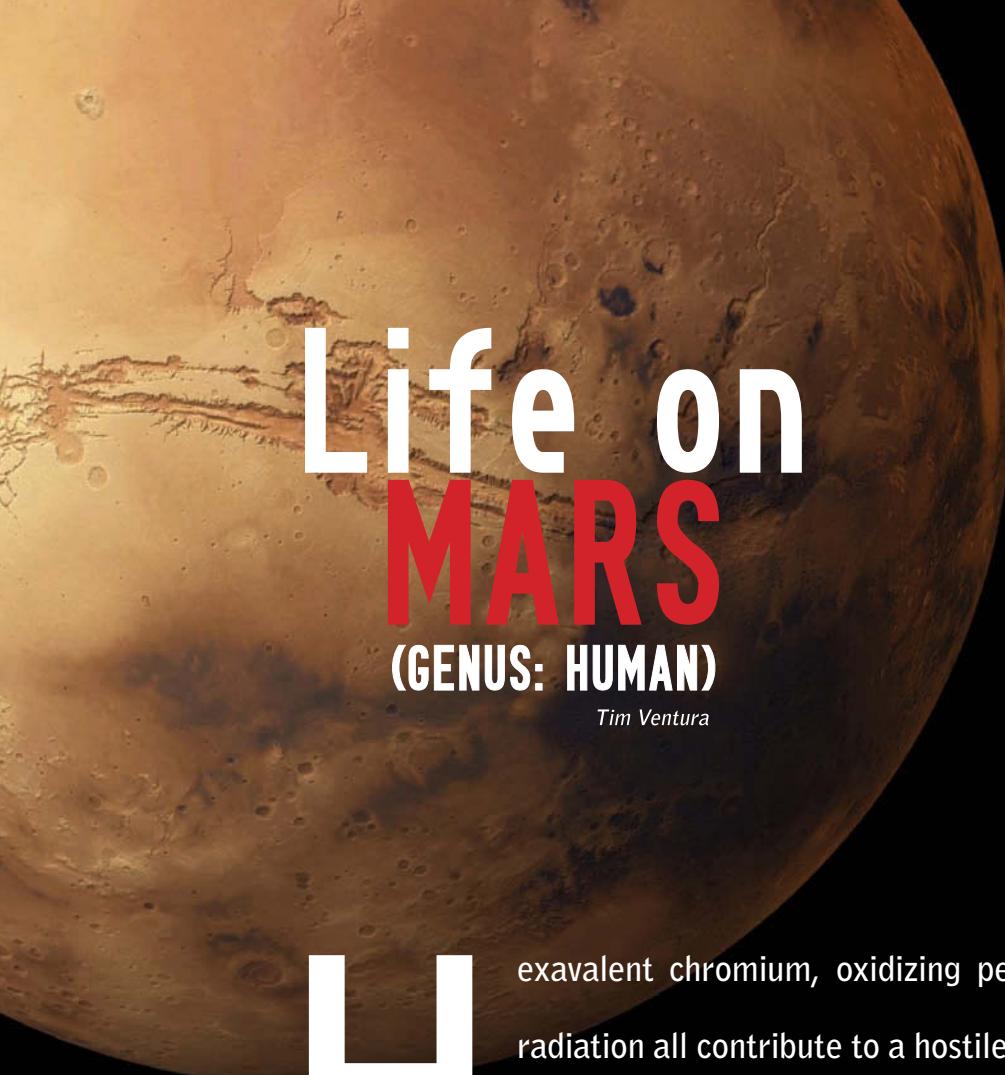
DANIEL SLATE

More medical researchers are questioning the standard one-disease-at-a-time approach that has dominated the search for cures to aging-related illnesses such as cancer, heart disease, diabetes, Alzheimer's, and Parkinson's. On November 21st, Brandon Keim reported, on the Wired Science blog, that researchers frustrated with the limited success of the narrower conventional approach are opening up to the idea of using mitochondrial medicine. The aim is to ward off the diseases caused by aging by addressing their shared sources, repairing and preventing the damage caused by the free oxygen radicals released as the mitochondria degenerate and break down.

A number of new anti-aging drugs are in development and could be on the market within the next five years. Resveratrol, probably the best known of the mitochondrial drugs (it's that stuff in red wine), is currently in clinical human trials for diabetes. While first experiments using resveratrol in mice did not appear to extend their maximum lifespan, it did have the expected effect of mimicking the cellular effects of caloric restriction, stimulating genes called sirtuins that are involved in the aging process. Although the mice died within their allotted biological span, they were "protected from the ravages of aging," according to Keim. Keim reports that the CEO of Sirtris Pharmaceuticals, the company that is leading the resveratrol trials, claims that all the major pharmaceutical firms are putting research money into mitochondrial medicine.

On November 27th, Science Daily reported that Harvard researchers Philipp Oberdoerffer and David Sinclair have shown that sirtuins regulate gene expression by preserving the integrity of chromatin, and they repair damaged DNA — but they can't do both at once. Sometimes, when sirtuins work to repair DNA, some of the damaging genes they keep silent express themselves. This now seems to be the actual cause of aging. The article indicates that sirtuins could be part of a universal mechanism of aging that evolution has conserved for a billion years. A cell with more sirtuins — or a more efficient distribution of them — would be able to reduce or prevent the expression of genes linked to the phenotypes of aging.

Research scientists vary in their optimism about future sirtuin and mitochondrial therapies, but most now see these types of interventions in the diseases related to aging as inevitable. Some of these therapies are expected to be inexpensive. Sirtris anticipates its resveratrol drug will sell for no more than \$4 a pill — in order to be competitive with other diabetes drugs — and it will cost "pennies" once the patent expires. ☺



Life on MARS (GENUS: HUMAN)

Tim Ventura

Hexavalent chromium, oxidizing perchlorates, and cosmic radiation all contribute to a hostile environment that could make the planet Mars uninhabitable... but in the 21st century, "uninhabitable" ain't what it used to be.

In his paper, "Advanced to Revolutionary Technology Options for Humans on Mars," NASA Chief Scientist Dennis Bushnell tackles the challenge of overcoming obstacles to Martian colonization through a combination of information technology, nanotechnology, and genetic engineering solutions to colonize the planet first with machines and later by mankind.

Sound far-fetched? The first part's already in place: networked machine intelligence is finding practical use on Mars since the deployment of the Mars Reconnaissance Orbiter, which not only

performs detailed analysis of the Martian terrain using cameras, spectrometers, and radar, but also functions as the communications relay for a network of probes planned for future missions.

As for us, Bushnell advocates utilizing genetic engineering to harden future colonists against radiation and bone-density loss from Mars' lower gravity in addition to using nanotechnology to repair the radiation-damage from incoming cosmic rays. The result? Better humans living longer lives on a mission to another world that's already started. ☺

Way Past DICK TRACY

Tristan Guillford

Parvus is taking portable computing devices to the next level with the Zypad Wrist Wearable Personal Computer (WWPC). Lightweight (250 grams) and designed for hands-free operation, the Zypad is secured with a wrist strap and can be run using either the Windows CE or Linux operating systems. It features a mini keyboard, a touch screen, USB port, 400MHz processor, and permanently connected wireless Internet utilizing Bluetooth and GPS technology. A built-in "accelerometer" with a tilt sensor allows the wrist computer to determine whether its user is moving or motionless, and to supply global positioning data in real time to someone connected via wireless.

While the Zypad is not currently available in America, Parvus, a U.S. subsidiary of the Eurotech group, is testing the wrist computer for several potential job site uses involving fields such as emergency services, health care, shipping and logistics, wilderness safety, law enforcement, and the military. Health care uses could involve transferring patient data to doctors in real time. Forest service workers and park

rangers could use the WWPC to track animals and help with wilderness rescue. The military could use the wrist computer to communicate precise information about troop movements and control machines remotely during combat. And, of course, this mini computing technology could eventually become as ubiquitous as popular portable devices palm pilots or PSPs, employing many of the same features of mobile devices like the iPhone or Blackberry, but with greater processing power and more durability. ☺

RESOURCES

Zypad Wrist Wearable Wireless Computer
[http://www.parvus.com/products/
ProductPage.aspx?ProductID=117](http://www.parvus.com/products/ProductPage.aspx?ProductID=117)



“Wave” Goodbye to Peak Spectrum

Tim Ventura

Is the wireless industry facing hard times? Increasing spectrum use from a greater number of carriers and the advent of wireless broadband is carving our once-plentiful broadcast spectrum into smaller chunks that cost carriers more to license. Add in the dark specter of health litigation over cell phone safety and the debate surrounding BPL pollution of CB radio wavelengths, and the wireless industry is starting to look a bit like big oil. Is it time to face the fact that spectrum isn't an inexhaustible resource?

In the 2007 STAIF Conference publication “The Value Estimation of an HFGW Frequency Time Standard for Telecommunications Network Optimization,” Dr. Robert Baker, Jr. and colleagues Gary Stephenson and Colby Harper propose a novel alternative to the overcrowded electromagnetic spectrum: instead of transmitting data using radio waves, they suggest that future technologies using “High-Frequency Gravitational Waves” might transmit data over ripples in the fabric of time-space itself. Sound far-fetched? Maybe, but the authors of the peer-reviewed AIP publication insist that their concept falls well within established physics, and thus far nobody's disputing the claim. ☺



Storage Goes Solid State

Tim Ventura

Sure, it holds 500 gigs of movies, music, and data, but the demands of modern computing are starting to make that spinning silver platter in your typical hard drive look downright antiquated.

It's a problem of speed: hard-drives are electro-mechanical in nature, which means that when they read or write data, an armature has to physically move a needle across a rotating platter. This puts the brakes on both operating speed and miniaturization, and has manufacturers racing to launch solid-state hard drive (SSD) solutions.

Today's best SSD's store data using DDR or Flash memory, but they're expensive and offer only limited storage capacity — great for MP3 players and digital cameras, but don't expect to see them in your next PC. However, next-generation products like Fusion-Io's NAND-based SSD

feature near-DDR access speeds and terabytes of capacity — finally giving this technology an opportunity to break into the PC marketplace.

The applications of this technology are far-reaching: solid-state devices are integrated circuits, which allows them to benefit from the same advances in speed and miniaturization currently used in processor development. Also, the near-DDR speeds of SSD devices may soon eliminate the need for computer RAM entirely, giving software developers new options in the way tomorrow's productivity applications handle memory and store data. ®



THE GLOBAL FINANCIAL CRISIS:

A Hiccup on the Path to Superintelligent Financial Markets?

BEN GOERTZEL

One of the many interesting aspects of the current global financial crisis is the role that AI and advanced computer software has played in it. It's worth asking a few questions about exactly what this role has been — and what it suggests for the future.

There's not much "strong AI" used in the finance industry today, but there are plenty of "narrow AI" software techniques in place, alongside other advanced mathematical methods — recognizing subtle nonlinear patterns in financial data, and relating financial data with

other information about the economy, news, weather and so forth. And, certainly, this software played a role in the crisis that unfolded this fall.

But before we blame the machines, it's worth digging a little deeper. The root of the problem really came down to the ways people chose to use this software to serve their own ends. And it's arguable that, if we'd had strong AI instead of narrow AI involved, a crisis like this would never have come about.

Getting into the nitty-gritty, perhaps the central factor that paved the road to the recent financial disaster was the use of massive leverage — a technique allowing investors to gamble much more money than they actually have. If you bet \$10 on some financial instrument

with 30x leverage, you're effectively betting \$3000. This means that if the instrument you're betting on goes up by 10%, you make \$300 from your \$10 investment. But if the instrument goes down by 10%, you lose \$300, which may be more money than you have. Leveraged investment obviously has great potential for both risk and reward — so its effective usage hinges on the accurate assessment of risk.

And risk assessment is one place where AI and other advanced software comes into play. The central aspect to consider, in understanding the strengths and limitations of advanced techniques for risk assessment, is context. The known mathematical and AI techniques for estimating the risk of complex financial instruments (like credit default swaps, and various other exotic derivatives) all depend on certain contextual assumptions. They apply well in some contexts, and not others. At this stage, some human intelligence is required to figure out whether the assumptions of a given mathematical technique really apply in a certain real-world situation. So, if one is confronted with a real-world situation where it's unclear whether the assumptions of a certain mathematical technique really apply, it's a human decision whether to apply the technique or not.

As a single example, Iceland's financial situation was mathematically assessed to be stable, based on the assumption that (to simplify a little bit) a large number of depositors wouldn't decide to simultaneously withdraw a lot of their money. This assumption had never been violated in past situations that were judged as relevant. Oops.

And of course, these technical considerations synergize with human psychology in various ways. Suppose you work for a financial institution and you're asked to assess the risk of some complex financial instrument like a credit-default swap. Suppose the tools that you have at your disposal don't let you make a confident assessment? What are you going to do? Admit it, or just try your best, and hope the world

doesn't fall too far short of the assumptions of the techniques you apply? Bear in mind that the reward structure for high-level financial employees tends to give big bonuses for decisions that lead to short-term gains. So if you play a role in a big win you may get rich but if you play a role in a big loss, the worst that happens is you'll need to find another job. But consider a more interesting question: What happens in another decade or two, when the AI field has progressed a bit and we have yet more intelligent software that is able to automatically assess whether the assumptions of a certain mathematical technique are applicable in a certain context?

It may sound cavalier to say so (and the reader should understand that, as the owner of a small business, I've certainly not escaped the impact of the recent credit crunch), but my feeling as an AI expert is that these sorts of problems we've seen recently are merely hiccups on the path to super-efficient financial markets based on advanced AI. (On the other hand, it's hard to say exactly how long it will take for AI to achieve the needed understanding of context, to avoid this sort of "minor glitch.")

Once the transhuman future fully kicks in, it's quite possible that money will become obsolete. Or maybe, as in Charles Stross's novel *Accelerando*, the next form of intelligence will emerge from complex AI-powered financial instruments. But well before these radical possibilities come about, I'd suggest that a big difference will be made by the deployment of more strong-AI-ish financial analysis systems with broad understanding of context. Whether further glitches occur along the path to this future is another question, of course and the best piece of advice I can offer in this regard is that the movers and the shakers of the financial world should pay attention to the limitations — as well as the power — of current techniques, while also keeping an eye on the development of more advanced AI methods capable of overcoming these limitations. ☺

Ben Goertzel is the CEO of AI companies Novamente and Biomind; a math PhD; writer; philosopher; musician; and all-around futurist maniac.



THINGS TO DO WITH Your Body While You Wait for **IMMORT**

Alex Lightman

For those who would live longer, it's wise to face challenges every day, and put oneself in uncomfortable situations that require growth — physically, mentally, and emotionally. Part of the fun of being a transhumanist can involve measuring your progress across an increasing number of variables and seeing how improvement in one area can create unexpected and even synergistic progress in other areas. My advice would be to establish baselines and sophisticated objectives for strength, speed, endurance, stamina, balance, coordination, agility, skill (perhaps in a growing number of activities), days free of illness or injury, as well as body weight and, of course, the number of years spent being alive. Here are some of the tools to help achieve this.

ALITY

TRANSHUMAN SUPERSHAKE

Five days a week, I fuel my body with over 200 different foods, via a 40-ounce shake that is comprised of an antioxidant juice like Acai or Goji berry juice; a non-dairy milk from almonds, hazelnut, rice or hemp; a banana; a raw egg; a scoop each of Jon Barron's Private Reserve Superfood, Muscle Milk, and Greens & Whey; and small quantities of flax oil, virgin coconut oil, Sambuca Guard, carnitine, creatine, chlorophyll, clove, black walnut tincture, and pau d'arco. I also take pills with this: a multivitamin, Joint Vibrance, Q-10, Smart Blend (CLA, GLA, and omega fatty acid complex), and Hyperdrive.

BODY FAT ANALYSIS

There is the low-budget way to do this — have a health club weigh you; then input pinches of body fat from thigh, abdomen and other places into a spreadsheet. And then there's a more expensive way. Get yourself dunked into a tub of water and, like Archimedes in his Eureka moment, have your density measured. In any case, body fat is a more useful measure than weight, and shame on *The Biggest Loser* for not using it as their measure of success. The three-and-seven point pinch test is often done for free by gyms such as Equinox, to give you a baseline and encourage private training.

LIVE BLOOD ANALYSIS

For \$275, I had a non-doctor take drops of my blood and put them fresh from my veins onto slides and under a 5000x magnification microscope. I then took a three-hour tour, looking at everything on a large flat screen. I could see the impact of dehydration, too much animal protein, inadequately circulated lymph, and even the legendary free radicals, which I had assumed were as hard to visualize as neutrinos. Warning: some doctors despise this practice and rail against it on the Web. Then again, many doctors are fat, smoke, and eat bacon. No doctor that I know of prescribes Alcor, so read the criticisms and then decide for yourself.

HRM GPS

For \$150 to \$200 you can get a heart rate monitor that allows you to do training in different zones and know roughly whether you are aerobic or anaerobic, and to see your progress over time. For \$495, you can get the Garmin 405, which adds GPS. This system doesn't only measure how far you've run, it gives you a graphic profile on their website. To get the information to Garmin, you synchronize your 405 with a wireless device called an ANT that you plug into a USB slot on your computer. Once you have the results, you can email these to friends to show them how hard your heart had to pump to enable you to do your workout.

BLOOD LACTATE TEST

For \$195, Phase IV in Santa Monica, CA allows you to know your precise zones for aerobic, lactate threshold, and anaerobic workouts and gives you a suggested program based on your cardiovascular fitness. This provides the best baseline for using a heart-rate-monitor watch. The goal is to stay within certain prescribed numbers. Interestingly, there are different numbers for recommended heart rates related to walking, running, swimming, cycling and rowing, though each test costs money.

XTERRA TRIATHLONS AND TRAIL RUNS

Xterra is a global phenomenon, with local, regional, national and world championships that — at least up to the present season — allows anyone to run with (well, start running with) the former world champions. For \$50-100, you can register for an off-road experience. This can just be a run, or it can start off with a lake or river swim followed by mountain biking. Every Xterra is different, and beautiful



scenery is an added value of trail running. Also, with terrain variety, every footfall is very slightly different, so there's less likelihood of the repetitive strain injuries that can come from road running alone.

ULTRARUNNING

In the last few years, there has been an explosion of ultramarathons. Ultramarathons are any running race longer than 26 miles and 285 yards. Typically, runners progress towards an ultimate goal of running 100 miles. First, one prepares to run 50 kilometers (31 miles). Next comes a 50-mile run and, finally, the 100-mile run. Many seemingly ordinary people end up being able to run 100 miles in less than 24 hours, even including runs up and down mountains, and across rivers. Transhumanists will be interested in the almost universal experience of 100-mile completers. Most report that they expanded their sense of the possible, and took that one-day experience with them into the rest of their lives. Because most of these races are on trails, runners also develop strong communities of superfit friends, become experts at hydration, nutrition, salinity, and weight, and develop a unique balance of proprioception, as well as low heart rates.

CROSSFIT

The gold standard for fitness, this is probably the most comprehensive and inclusive program available outside of an Olympic decathlon qualifiers program, for developing strength, speed, endurance, flexibility, agility, and more. For about \$300 a month, you can get an hour a day of intense workouts that are creative, challenging, measured, and allow progress to be charted across dozens of variables. If I had to recommend one thing out of all of these, I would recommend becoming a crossfitter.

TREADMILL DESK

This is the brainchild of Dr. James Levine, a cardiologist at the Mayo Clinic. A Google search of the term will show how to turn a normal treadmill into a treadmill desk: simply bolt a tray and a flat screen onto metal arms so that it swings out above the control panel. Dr. Levine recommends a one-mile-an-hour slow walking speed. Users who walk (creep along) for eight hours will end up walking 8 miles, and burning about 800 calories. If you did this 50 weeks a year, you would burn 200,000 calories a year, or the equivalent of 57 pounds of fat, or running 57 marathons, all without breaking a sweat. The most expensive commercial version of a treadmill desk is the Walkstation, which sells for \$3,000 from Steelcase.

Get yourself dunked into a tub of water and, like Archimedes in his Eureka moment, have your density measured

SLEEPING ATOP CHOMOLUNGMA

High altitude-living enables athletes to generate more red blood cells and other adaptations that, when they return to sea level, gives them an aerobic advantage. Three companies make machines that — in combination with plastic tents or sealed rooms — allow for the gradual reduction in the amount of oxygen present. After several months of careful adaptation, one can end up with effects equivalent to sleeping on the oxygen-reduced summit of Mt. Everest. A rule of thumb is "live high, train low." In other words, sleep in a low-oxygen environment, but then do workouts in a normal gym, because an athlete can't train as hard with less oxygen. The machines that suck out the oxygen cost thousands of dollars, but for people looking for an edge in their distance races, the price is worth paying. ☺

*Alex Lightman is the author of *Brave New Unwired World* (Wiley 2002), the first book on 4G, and over 120 articles on business, technology and cool people. His first article was published in June '83, the month he graduated from MIT, as the cover story for *The Futurist* magazine. He has lost 70 pounds while cutting his body fat from 33% to 16% in the past 13 months using these and other methods. He invites friending on Facebook.*

RESOURCES

Private Reserve Superfood

<http://www.baselinernutritionals.com/>

Equinox

<http://www.equinoxfitness.com/>
Live Blood Analysis — Google the term and explore the controversy

Polar HRM

<http://www.polarusa.com>

Garmin 405

<http://www8.garmin.com/learningcenter/training/forerunner405/>

Phase IV

<http://www.phase-iv.net/>

Xterra

<http://www.xterraplanet.com>
Ultrarunning

<http://www.run100s.com/>

Crossfit

<http://www.crossfit.com/>

Walkstation

http://www.steelcase.com/na/walkstation_products.aspx?f=30670

Treadmill Desk

<http://www.treadmill-desk.com/>

High Altitude training

<http://www.hypoxicco.com/>
<http://www.altitudetraining.com/>

Opportunities

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MOIRA'S LAW

Moira A. Gunn, Ph.D.

The new millennium brought us the culmination of the Human Genome Project, but this didn't mean that there was one single human whose genome was decoded. Rather, it was a deliberate combination of adults, most of whom were unidentified volunteers from Buffalo, New York, along with J. Craig Venter, who jumped in and churned up the water, but that's another story.

It's taken until 2008 for any individual to have his DNA completely decoded and publicly published. The first four are: James Watson of Watson & Crick fame (sans two biomarkers which are currently believed predictive of Alzheimer's), J. Craig Venter again (who most agree probably beat Watson to the digital punch but held back for history's sake), an unidentified Asian male, and an unidentified African male.

One might ask why this is important. And it's a good question. The truth is: It's not. Not yet, anyway.

Think of it as the biotech equivalent of Metcalfe's Law. Bob Metcalfe is a well-known computer scientist, who co-invented the Ethernet and founded the communications company 3Com. He's been all about networks for decades and he formulated Metcalfe's Law as follows: "The value of a telecommunications network is proportional to the square of the number of connected users of the system." For most of us, it means this: The value of one telephone — where you can call no one — is zero. The minute someone else gets a telephone, then the two of you can talk and the value of all telephones goes up. As more and more people get telephones, the value of the whole network goes up. It's an idea anyone can understand.

Getting back to this whole-genome decoding of human DNA, it's not the same. The decoding of the second one only marginally increases the value of the first, if it does at all. We see the DNA decoded all right, we see the raw data but we don't know what it

means yet. In the meantime, we've decoded smaller swaths of human DNA, and we've discovered quite a lot. We once thought we got one set from Mom and one set from Dad. It turns out that we sometimes get multiple copies of strings of DNA from the same parent. Could these variants be the "nature" part of the "nature vs. nurture" equation, the reason why children of the same parents each seem to be a lot more different than alike?

A team of Swedish scientists from Karolinska Institute discerned that men with the "334 version of the AVPR1A gene" had trouble committing. They were less likely to be married, and if married, were more likely to report having marital problems. Having two copies of this DNA only made things worse in the marriage and serenity department.

And thus, a little bit of DNA information leaves open the door to a lot more inquiry.

But when we talk about "whole genome" DNA — and a whole planet — how much data would that be? The calculation appears to be simple: Each human has some three billion base pairs of DNA, each represented by a letter.

A team of Swedish scientists from Karolinska Institute discerned that men with the "334 version of the AVPR1A gene" had trouble committing.

That would be six billion letters, or six gigabits of data. Your own DNA data would fit on thumb drives already floating around in your possession or on the memory chips of your digital camera, but that adds up when we get to all the humans on the planet. In round numbers, there are six billion-plus folks, and that makes six billion humans times six gigabits, and that's a whole lotta data.

Then we have the big presumption that we have the technology to store all that data, and to analyze it, and that in doing so, there would be value.

Which returns us to the question: Does it follow Metcalfe's Law? Does the value of the human network of decoded DNA grow with every human fully decoded?

It would seem not — the value of the

second telephone is only compromised if we don't want to talk to the second person, but we are quickly motivated to find someone we want to speak with online. With DNA, it doesn't appear to work that way. In fact, that's possibly been proven by whole-genome decoded Human Number Five.

This time it's a woman, and it's completely different. Read the November issue of *Nature* if you want the details, but the basic story is this: A woman in her fifties had developed acute myelogenous leukemia (AML), a very aggressive cancer. Washington University scientists decoded the DNA of her tumor cells and then also decoded the DNA in

her normal cells. And why? The clue here is that whenever a cell divides, it can mutate. And that mutation can be carried forward every time the cell divides from then on. Over a lifetime, particular cells in your body can mutate a lot. When you have cancer, there has been a sequential series of mutations in some of your cells, which, when combined with your starter DNA, has created a formula in which your cells can — in the vernacular — run amuck. That's right. If you have cancer, the DNA in your tumor cells are different from the DNA in the rest of your body. So, we humans are not just a single set of DNA. Mutations happen. Pair them up with your starter DNA, and the result can be benign or deadly.

That's why the decoding of Human Number Five was a lot more interesting — for the first time, scientists examined two complete sets of DNA within the same person.

Previously, two gene mutations were associated with AML. After decoding this woman's DNA and performing a whole lot of sophisticated computer analysis, they have

uncovered 10 mutations. Three are in genes known to suppress tumor growth — that's not good. Another four mutations were found in genes known to promote cell growth — which is bad if it's a tumor cell. Another gene basically strong-armed the chemotherapy generally prescribed for these patients, so the patient would suffer all the side effects of the treatment and little, if any, of the benefits. Why this set of DNA mutations created a dire situation became eminently clear.

To see if they could generalize, the scientists looked at 187 other AML patients — none had these new mutations. They suspect that cancers may be very specific to the individual.

They believe that cancer cells develop successively, mutation by mutation, until some particular moment when a cruel combination of new mutations and starter DNA arrive together and a catastrophe of cell growth occurs.

So what does this mean — at least on a digital data level? Without a doubt, we are now experiencing the Big Bang of Biotech Data. Not because we can simply create all this DNA data, but because we need to create all this data to figure out who we humans are and how we tick. But unfortunately, we don't know what data we need for what, and what — in the end — will prove useful. We are still shooting in the dark.

So, while with the simple telephone example, we can easily get a sense that Metcalfe's Law is true for networks, it doesn't quite translate to DNA.

But that doesn't mean we can't have a law about it. I call it "Moira's Law": "The value of decoding human DNA is proportional to the number of people who will benefit."

I'm sure I'll be changing it as the bio age unfolds, but in the meantime, it seems to me like a good way of thinking about it. ☺



Moira A. Gunn, Ph.D. hosts "BioTech Nation" on NPR Talk and NPR Live. She's the author of Welcome to BioTech Nation: My Unexpected Odyssey into the Land of Small Molecules, Lean Genes, and Big Ideas, cited by the Library Journal as "Best Science Books of 2007."

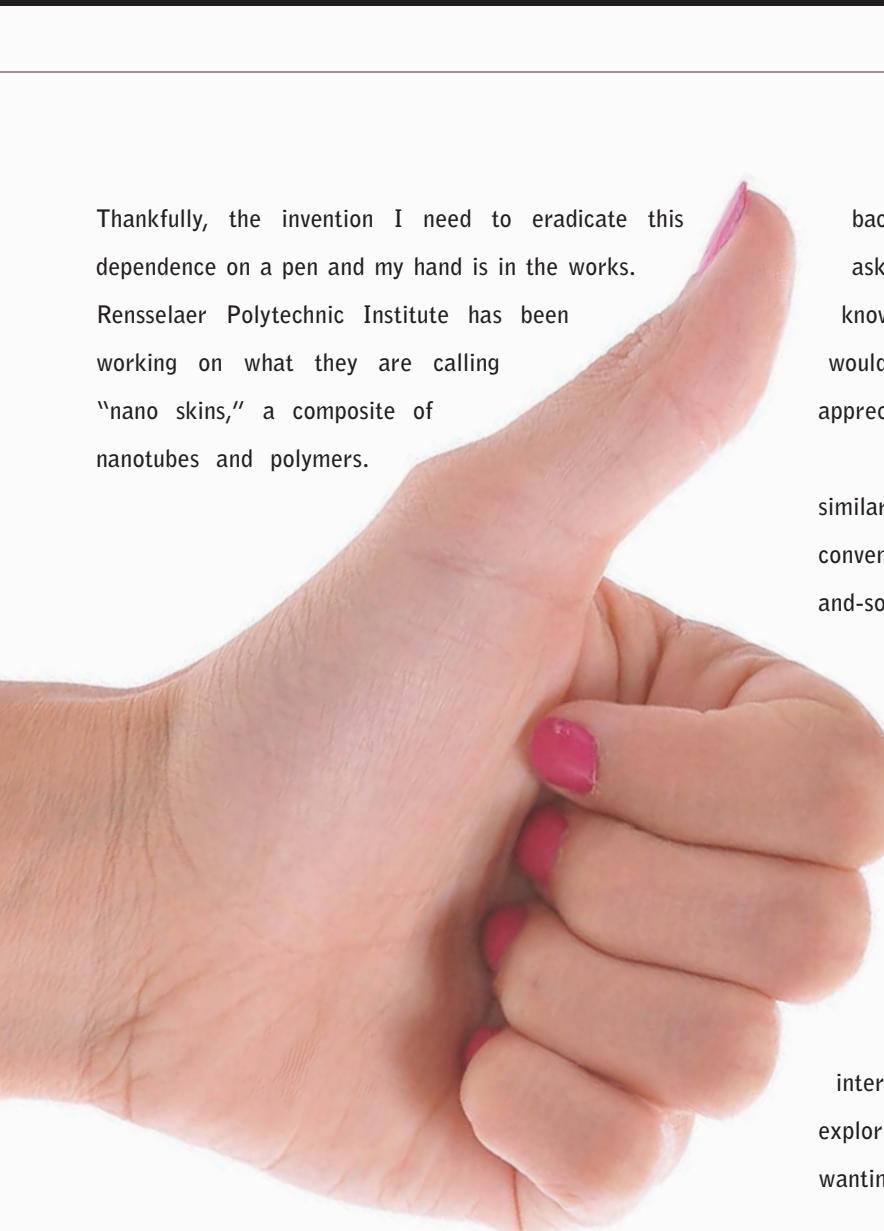
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NANO TATTOOS

Kristi Scott



Being forgetful, I frequently find myself writing reminders on my hand or anywhere else I can. This past week I wrote and rewrote the same word on my left hand every day, and I still forgot when it came time to remember. However, my hand still shows faint ink marks, which now linger and constantly remind me of how forgetful I can be.



Thankfully, the invention I need to eradicate this dependence on a pen and my hand is in the works.

Rensselaer Polytechnic Institute has been working on what they are calling "nano skins," a composite of nanotubes and polymers.

Their invention is flexible and thin enough to fit underneath the skin, without losing the ability to conduct electricity. That's a lot of work for something so incredibly small. With these attributes, the potential real-world applications of the technology are simply awesome.

Among the uses envisioned for the "nano skins" are facial or hand displays. These displays would be synched to a WPAN, or Wireless Personal Area Network. (Yes, you would become wireless.) There would be a display driver implanted to receive signals and allow you and others to communicate wirelessly. This would allow you to send information about remembering things instantly or communicate to someone else discretely, receiving a friend's text to your hand instead of your phone. However, upgrading your texting capabilities is not all that this display driver would be good for. You could also have the option to communicate

back to your friend your mood. That way, they won't have to ask how you are doing; they can just take one quick look and know. Unless, that is, you've forgotten to update it: then you would literally be sending mixed signals, and your friends may not appreciate that.

Will I still forget to remember? I envision a texting set-up similar to my computer's calendar. A timed notice would appear conveniently on my hand saying "15 min till you have to call so-and-so" or "1 day till you need to bring work cupcakes."

In a similar vein, a "nano skin" project concept is being probed for feedback by Koninklijke Philips Electronics. They provide a video vision of what the digital tattoo may look like if programmed to react to sensual interaction or interaction in general. The video is located at their website. The video gives an absolutely beautiful interpretation of a way to utilize the tattoo as a sensual enhancement, showing the tattoo appearing and then disappearing through the couple's interaction. Overall, the company is to be congratulated for exploring a desirable implication of this technology that has me wanting one of my own.

If you take the sensuousness out of the video interaction and replace it in your imagination with the same individuals at a crowded concert or party, their bodies would be a swirling cacophony of art, possibly attuned to the music, or sensitized to every bump they receive from fellow concert/party goers.

Having viewed this video several times and looked at their artistic conceptions of digital tattooing, I'm enthusiastic. This is one enhancement I would not want to miss out on. Non-verbal communication, personal reminders on-hand, and an interactive tattoo for when I'm bored and want to watch it swirl.... sign me up. ☺

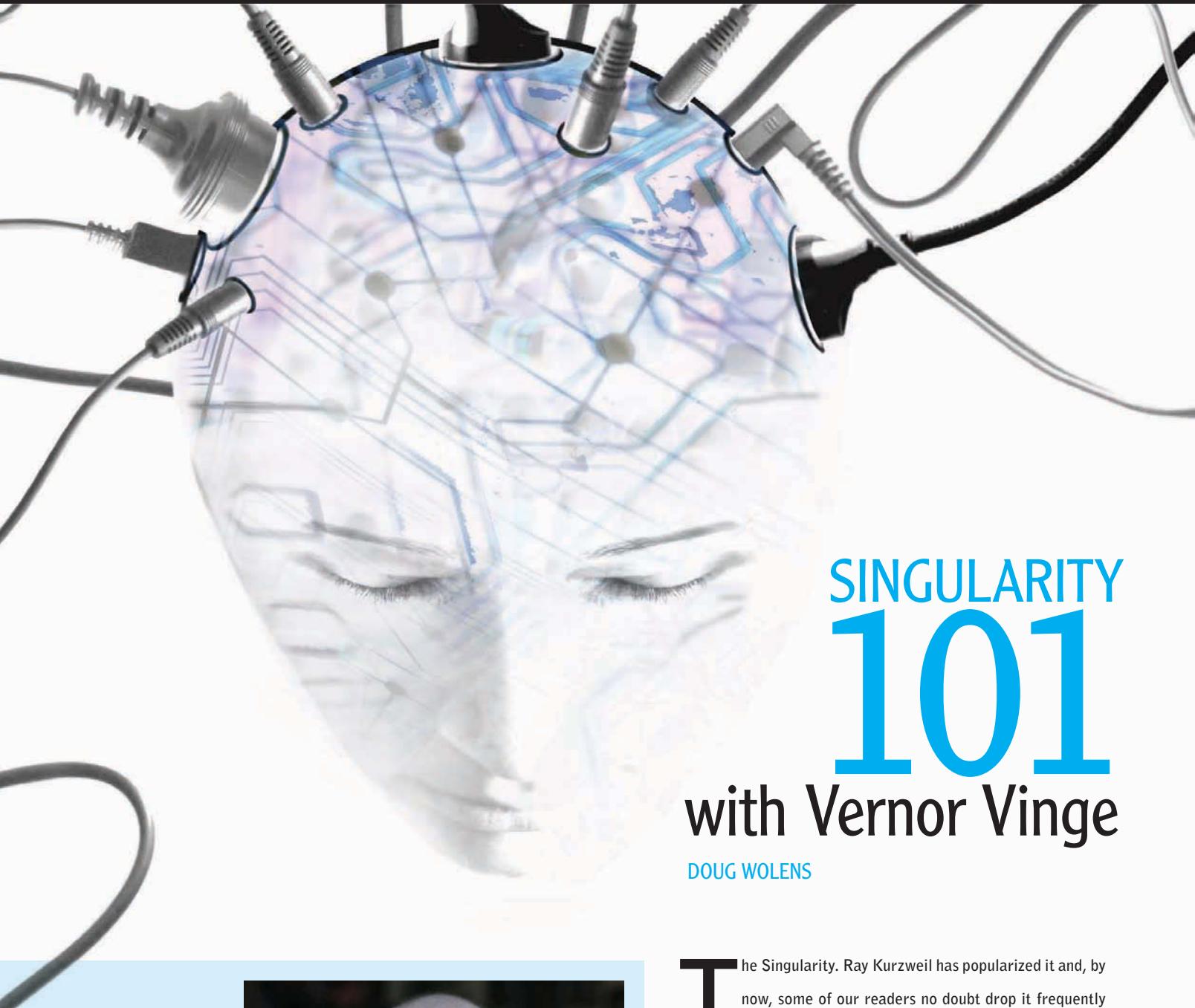
RESOURCES

Nano Skins
[http://news.rpi.edu/update.
do?artcenterkey=1394](http://news.rpi.edu/update.do?artcenterkey=1394)

Koninklijke Philips Electronics.
[http://www.design.philips.com/
probes/projects/tattoo/index.page](http://www.design.philips.com/probes/projects/tattoo/index.page)
Contextual Digital Nano Tattoos

(Video)
[http://yista.com/2008/04/09/
contextual-digital-nano-tattoos/](http://yista.com/2008/04/09/contextual-digital-nano-tattoos/)

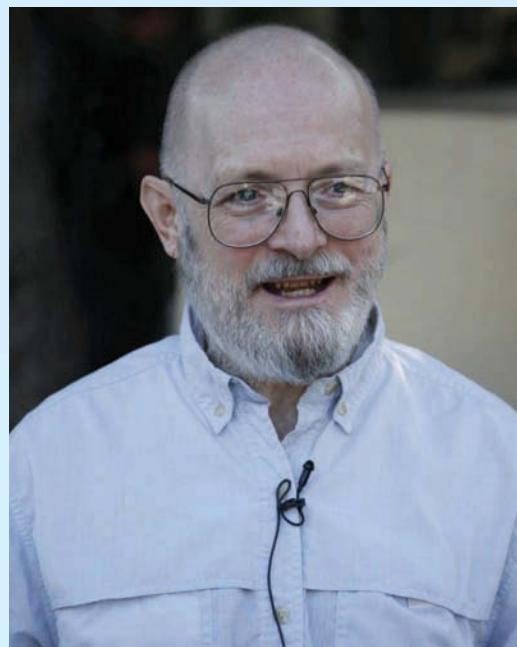
Programmable Tattoos
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SINGULARITY 101

with Vernor Vinge

DOUG WOLENS



The Singularity. Ray Kurzweil has popularized it and, by now, some of our readers no doubt drop it frequently into casual conversation and await it like salvation. (The second "helping?") But many more are still unfamiliar with the concept.

The contemporary notion of the Singularity got started with legendary SF writer Vernor Vinge, whose 1981 novella *True Names* pictured a society on the verge of this "event." In a 1993 essay, "The Coming Technological Singularity," Vinge made his vision clear, writing that "within thirty years, we will have the technological means to create superhuman intelligence. Shortly after, the human era will be ended."

We caught up with Vinge at the 2008 Singularity Summit in San Jose, California, where he opened the proceedings in conversation with Bob Pisani of CNBC.

Vinge's most recent novel is *Rainbow's End*.

h+: Let's start with the basics. What is the Singularity?

VERNOR VINGE: Lots of people have definitions for the Singularity that may differ in various ways. My personal definition for the Singularity — I think that in the relatively near historical future, humans, using technology, will be able to create, or become, creatures of superhuman intelligence. I think the term Singularity is appropriate, because unlike other technological changes, it seems to me pretty evident that this change would be unintelligible to us afterwards in the same way that our present civilization is unintelligible to a goldfish.

h+: Haven't there been other singularities throughout history?

VV: Some folks will say there have been singularities before — for instance, the printing press. But before Gutenberg, you could have explained to somebody what a printing press would be and you could have explained the consequences. Even though those consequences might not have been believed, the listener would have understood what you were saying. But you could not explain a printing press to a goldfish or a flat worm. And having the post-Singularity explained to us now is qualitatively different from explaining past breakthroughs in the same way. So all these extreme events like the invention of fire, the invention of the printing press, and the evolution of cities and agriculture are not the right analogy. The technological Singularity is more akin to the rise of humankind within the animal kingdom, or perhaps to the rise of multicellular life.

h+: Is the Singularity near?

VV: I'd personally be surprised if it hadn't happened by 2030. That doesn't mean that terrible things won't happen instead, but I think it is the most likely non-catastrophic event in the near future.

h+: Should we be alarmed by the Singularity?

VV: You are contemplating something that can surpass the most competitively effective feature humans have — intelligence. So it's entirely natural that there would be some real uneasiness about this. As I said, the nearest analogy in the history of the earth is probably the rise of humans within the animal kingdom. There are some things about that which might not be good for humans. On the other hand, I think this points toward something larger. Thinking about the possibility of creating

or becoming something of superhuman intelligence is an example of an optimism that is so far-reaching that it forces one to look carefully at what one has wanted. In other words, humans have been striving to make their lives better for a very long time. And it is very unsettling to realize that we may be entering an era where questions like "what is the meaning of life?" will be practical engineering questions. And that should be unsettling. On the other hand, I think it could be kind of healthy, if we look at the things we really want, and look at what it would mean if we could get them. And then we could move forward from there.

h+: What signs would you look for which indicated that

humans may not be best characterized as the tool-creating animal but as the only animal that has figured out how to outsource its cognition.

the Singularity is near?

VV: There are a number of negative and positive symptoms that a person can watch for. An example of a negative symptom would be if you began to notice larger and larger software debacles. In fact, that's sort of fun to write about. One of the simplest of positive signs is simply to note whether or not the effects of Moore's Law are continuing on track.

The fundamental change that may be taking place humans may not be best characterized as the tool-creating animal but as the only animal that has figured out how to outsource its cognition — how to spread its cognitive abilities into the outside world. We've been doing that for a little while ten thousand years. Reading and writing is outsourcing of memory. So we have a process going on here, and you can watch to see whether it's ongoing. So, for instance, in the next ten years, if you notice more and more substitution for using fragments of human cognition in the outside world — if human occupational responsibility becomes more and more automated in areas involving judgment that haven't yet been automated — then what you're seeing is rather like a rising tide of this cognitive outsourcing. That would actually be a very powerful symptom. ☺

is the future CANCELLED or just postponed?

ALEX LIGHTMAN

At the Singularity 2008 conference, a small group of smart people had Vernor Vinge surrounded and were pressing him to metaphorically roll them bones and read our civilization's horoscope. Vinge (interviewed in this issue), a retired professor of mathematics from San Diego State University and leading hard science fiction writer, had coined the term the Singularity, referring to a time when technological change would become so rapid, because of the creation of greater-than-human artificial intelligence, that predicting what would occur post-Singularity would become nearly impossible. The concept of the Singularity was embraced by other writers, ultimately spawning a culture of people who live, in part, to read the signs and portents of this astonishing event. In some formulations, the Singularity is the biggest change that humanity will ever create or experience.

Ray Kurzweil, already a major figure as the result of a number of books including *The Age of Spiritual Machines*, has reached a sort-of pinnacle of public notice after publishing *The Singularity is Near* in 2005 and viewing the world through a Singularitarian (yes, a real word) lens. In the book, Kurzweil gives his evidence that US GDP growth is exponential and contiguous. Or rather, he posits that due to the exponential nature of past US economic growth, the future will also see continuous exponential economic growth.

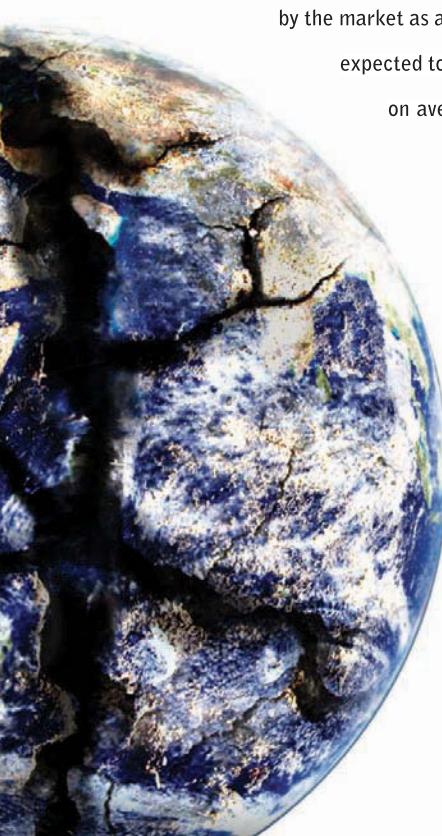
But will this growth be impacted as we experience an economic slowdown and global financial crisis? Will we still have all the good stuff that futurists and hard science fiction writers promise, including biotech that increases longevity, nanotechnology that revolutionizes manufacturing, information technology that improves productivity? And what about the Singularity? Speaking to the Singularity only, Vinge opined that nothing on the economic horizon was going to slow it down, because it only takes a few companies to keep up with Moore's Law and thus to make the breakthroughs that will bring this strong AI to fruition. From Vinge's perspective, the Singularity is still near.

But others look at the past and present and see indications that the future (a view of a world utterly transformed by technological change) has been cancelled. In a recent article for *Investor's Business Daily* entitled, "Venture Capital Theme of the Day: Death," Brian Deagon stated that only six venture capital backed companies had gone public in 2008, the fewest in over thirty years, and that the value of venture-based acquisitions fell 42% from the same 2007 period to \$11.2 billion. Deagon quotes National Venture Capital Association President Mark Heesen saying, "(I)f this goes on for another year or two, it means we won't have a fresh crop of new companies."

Since venture funds typically exist for eight years, and raise their money from a small fraction of total investments made by college endowments and other funds with a long-term investment horizon — and because many funds have lost half their value since September — and because the US and world economies are likely to get much worse before they get better, it is almost certain that we won't have a pipeline filled with well-funded start-ups ready to go public over the next seven years. And this could have a chilling effect on both the business and academic roles in creating the future that both communities have performed so superbly over the last three decades.

A bit of history may be in order. Once upon a time there was an artificial intelligence/expert system software industry, with companies focused exclusively on commercializing AI software and hardware. An AI software company called IntelliCorp (which started as IntelliGenetics) went public, and its rivals were also expected to follow suit. Then came the "AI Winter." Funding dried up. The bloom was off the rose, and though a number of the programming and interface conventions of that day have found their way into other software, those of us who were there at the time (I was in charge of the Southwest U for IntelliCorp)





know that the future we imagined didn't come to pass. In fact, it's safe to say that expectations were lowered by about 99%. No one, in 1986, could have imagined that applications that were well-established by then — Microsoft OS, Oracle's SQL database software — would still be the basis for the biggest revenues in software in 2008. Could what happened to strangle a single visionary technology industry in childhood happen to many diverse industries key to creating the future? Sadly, yes.

Corporations are considered living persons under US law. An unusual way to look at the financial crisis and the halving of equity values is that price-to-earnings ratios have also halved, and P/E ratios are an actuarial table (like those used by life insurance companies to predict when people with measurable characteristics will die). This is because the market capitalization of a company is (the market's expectation of) the net present value of all its future profits. Thus, a P/E ratio of 14 could be looked at by the market as a company expected to produce, on average, the

same profits for 14 years (not counting inflation), and then to cease to exist. Over the last 100 years, the average P/E ratio has been 14-16 (depending, in part, on how you calculate the number), and every time the ratio has gone above 20, it's dropped below 10 a few years later. In 2000, the S&P Index went above 40, but when it dropped, it hit above 20, making a drop of over 50% predictable and obvious to those reporting on it in 2004 (do a Google search of "average P/E ratio" and check the third link to Generational Dynamics for evidence).

If companies are living people, the drop in life expectancy for companies is comparable only to the fastest dying country in the world that is not at war — Zimbabwe, where life expectancy has fallen from 60 in 1990 to 34 today. Due to a combination of daily doubling of prices, starvation, and cholera, it's possible that life expectancy will halve again. It's possible that the value of companies will also halve again if a few things happen; for instance, if the US Treasury credit rating is downgraded, bankruptcies soar, or large banks continue to fail.

So. Is the recession of 2008 just a delay for the golden techno-future or something much worse? Current conditions are being compared to the years at the beginning of the Great Depression in the early 1930s, but then we came out of that in the late 1940s. Since the Great Depression, the average age of Americans has more than doubled, retirement has come sooner, and government benefits for the elderly retired, including medical and transfer payments, have increased by one

to two orders of magnitude. The 2000s were supposed to be the Roaring 2000s, the last golden-age boom time before the financial disaster starting in 2011 caused by three million baby boomers reaching retirement age. If the current crisis is a result of America's problems at the proverbial best of times, when the baby boomers are in peak earning years, how can US economics be better when current peak earners stop generating surpluses and start being net consumers? And what happens when interest on the federal debt exceeds the amount collected in individual taxes?

There is a possibility that federal fiscal collapse meets Baby Boom retirement, and all the money that would have gone into new technology goes into appeasing elderly voters. In that scenario, the Singularity might not happen in an expected timeframe and there would be no available life extension, or conditions on earth would be so unappealing that the average person wouldn't want to live longer, and thus, for most people, the future would be cancelled.

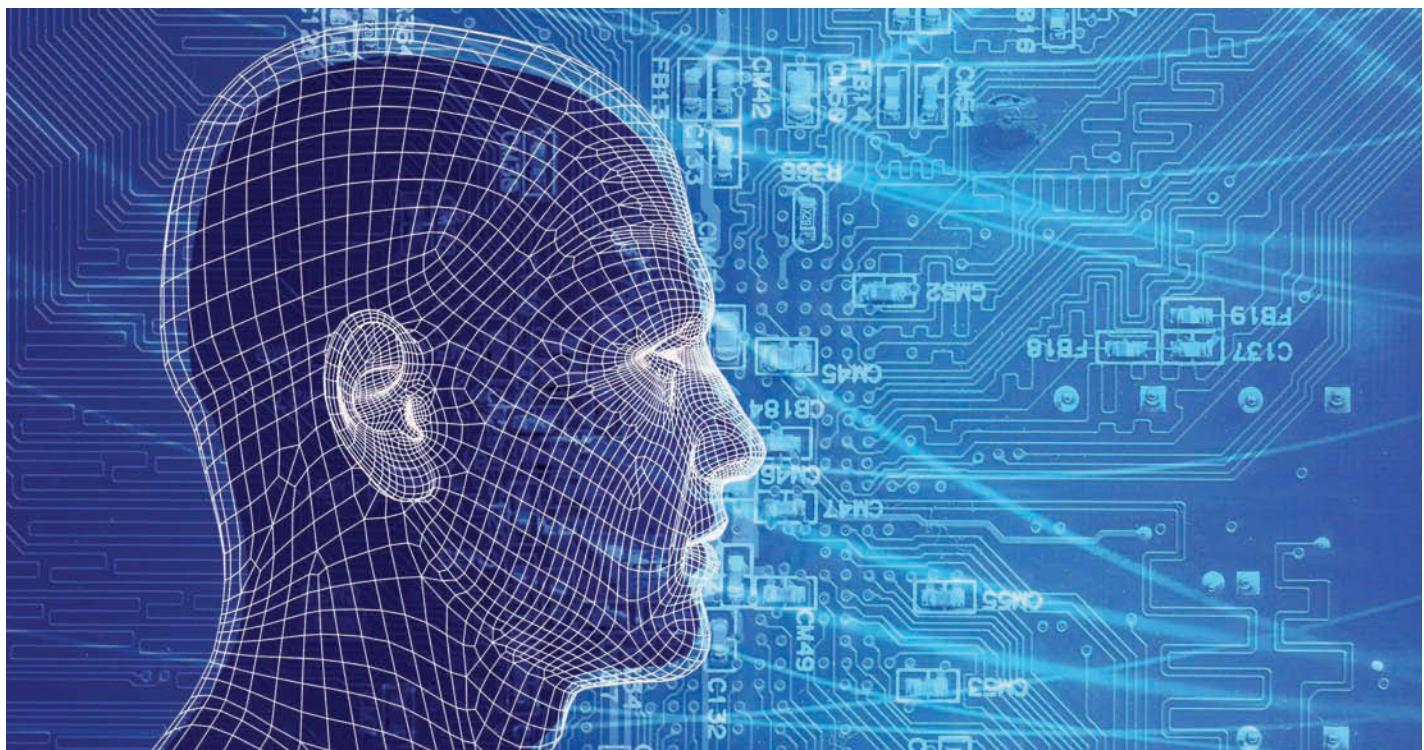
The moral of the story is that, for those of us in our forties and up, we need to redouble our efforts at birthing problem-solving technologies, and we need to make the future happen now or never (at least within the lifetimes of adults in 2008). Or we better hope that Vernor Vinge is right and that the Singularity doesn't require anything close to a healthy economy, in which case those smarter-than-us bots can take charge and knock off all of our problems like ducks in a row. ☺

as we experience a global financial crisis, will we still have all the good stuff that futurists promise, including biotech that increases longevity, and nanotechnology that revolutionizes manufacturing?

From Ginko to WaMu:

From Games to Warfar: Simulation in Virtual Worlds Models Real World Economic Behavior

SURFDADDY ORCA



A similar but much less sweeping series of bank failures occurred about a year earlier in Second Life.

It was the biggest bank failure in history, and it came on the eve of a series of very bad days for US investors. On September 26, 2008, JPMorgan Chase acquired all the banking operations of Washington Mutual (WaMu), including \$307 billion in assets and \$188 billion in deposits. The fall of WaMu was the latest turn in a series of bank failures: the bankruptcy of Lehman Brothers, the acquisition of Merrill Lynch by Bank of America and the near collapse of insurance giant AIG.

A similar but much less sweeping series of bank failures occurred about a year earlier in the computer-generated virtual world known as *Second Life*. Ginko Financial — an unregulated virtual bank that promised investors real money in returns in excess of 40% — declared

insolvency and was forced to repay \$200 million in an internal currency called Linden Dollars.

Second Life, established in 2003 by Linden Lab, is one of the first mainstream virtual worlds. In addition to its own currency (which can be converted to US dollars), it has a fledgling economy built around virtual goods. To buy or sell goods or services, you create a 3D graphical representation of yourself known as an avatar. Avatars can change appearance, talk with other avatars, and walk around inside of user-generated environments. More importantly, avatars can pay each other in Linden Dollars.

200 million in Linden Dollars may sound like a hefty sum for a computer-generated world. In fact, it is a mere 750,000 US dollars.

In response to the Ginko failure, Linden Lab shut down dozens of banks in *Second Life*. Although virtual, the banks were funded by real money. According to a new policy, *Second Life* residents cannot accept deposits in exchange for a promise of repayment with interest unless they provide proof of real-world regulatory oversight.

What can we learn about real-world economics using the simulations provided by virtual worlds? Metanomics is an emerging — even edgy — field of academic study that deals with the economic, legal, and regulatory issues of virtual worlds. Professor Robert Bloomfield, host of a weekly webcast on Metanomics, oversees Cornell University's Johnson School doctoral program and directs its business simulation

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laboratory. Bloomfield, trained in experimental economics, sees both the realism of a field experiment with the control of a lab experiment in virtual worlds: "I have been studying this space for, I guess, over a year now, and I think it's very exciting."

Bloomfield's avatar name is "Beyers Sellers," a nod to Nobel prize-winning economist Vernon Smith – Smith studied the behavior of buyers and sellers who bid competitively on fictitious commodities. Bloomfield calls *Second Life* markets a fascinating experiment in libertarianism and self-regulation. He says that everything he needed to know about the current real-world credit crisis he learned from virtual worlds: "Investors were all too willing to believe that they would earn their high interest rates, and bankers and borrowers, no doubt, were too willing to believe that the borrowers could pay the high interest rates demanded of them." Lack of regulation and subversion of honest financial dealings by a corrupt few in the interest of profit — sound familiar?

While Bloomfield's experimentation focuses on financial economics, how financial markets behave, and how they respond to regulations, Thomas Chesney of Nottingham University Business School is conducting experiments in behavioral economics using Ultimatum and Dictator games to examine fairness and altruism. In an Ultimatum game, individual A is given a sum of money and asked how s/he wants to split it with randomly paired person B. If the offer is rejected by person B, no one gets any money. In a Dictator game, person B has no choice but to accept the offer of person A. In tests conducted in both, Chesney found no statistical difference between the outcomes in *Second Life* and real life.

Ginko Financial and the other bank failures in *Second Life* were precipitated by a ban on gambling and shady business practices that bordered on fraud. WaMu failed under the weight of its enormous bad bets on the subprime mortgage business. In both cases, perhaps a trip to Las Vegas might have been a safer investment strategy. By studying the effects of self-regulated markets and fairness and altruism in virtual worlds, future experimental economists may be able to help guide real-world policy to avoid more failures like WaMu. ☺

Surfdaddy Orca is a virtual worlds explorer and science writer.

RESOURCES

JPMorgan Chase Acquires Banking Operations of Washington Mutual
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Bank Failure in *Second Life* Leads to Calls for Regulation
http://www.wired.com/gaming/virtualworlds/news/2007/08/virtual_bank

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<http://www.metanomics.net>

Metanomics Webcast
<http://www.metanomics.net/RobertBloomfield>

LEARNMORE



HACKING THE ECONOMY

Douglas Rushkoff

Hacking the economy is easier than it looks.

The first step, of course, is to remember that the economy itself is just a model. It's a way of understanding the world as a series of transactions made by rational, self-interested beings working to maximize value for themselves. That's supposedly the given.

Of course, it isn't even true. We don't live in an economy. Never did. If we were really all playing some sort of poker game for chips — and making all the right decisions — then our world might behave like an economy. But seeing as how we're really more concerned with our moment-to-moment experience, getting laid, or finding a private place to poop, the last thing on our minds is retention of value over time.

We do live amongst some really big economic actors, though. And the more we mistake the stage on which they act for the world in which we live, the less access we have to the script. We end up in the audience, watching the financial spectacle and — worst of all — mistaking it for real life.

The economy we live in is a rigged game, established around the time of the Renaissance in order to promote the welfare of early-chartered corporations and the monarchs who gave them license to monopolize world business. Until that time, there were many kinds of money in use simultaneously. People used centralized currency to conduct long-distance transactions, and local currency to transact on a more day-to-day basis.

Most people, in fact, never used centralized currency at all. They simply brought their season's harvest to a grain store, then got a receipt for the amount of grain they had deposited. This receipt was currency, redeemable at the grain store for something everyone knew had real value.

But since a certain amount of grain went bad or was lost to rats, and since the grain store had some expenses, this money lost value over time. Since the money would be worth less the following year than it was worth that day, the bias of the money was towards spending and reinvestment. That's why medieval towns built cathedrals: as a way of investing in the future with excess money from the present. They were that wealthy. Women were taller in medieval England — a sign of their good health and diet — than at any other time before the last two decades.

Local currencies allowed towns to create value and reinvest it in their own affairs. This was intolerable to an aristocracy already waning in power and influence. So European monarchs began to outlaw local currencies, and force everyone to use "coin of the realm." These centralized currencies had the opposite bias. They were borrowed into existence by businesses, and then paid back to the central bank, with interest.

Like most innovations of the Colonial era, centralized currency is a way to extract value from the periphery and bring it back to the center. People's labor no longer contributes to their own wealth, but to the lender's. Eventually, the lending economy — central banks and banks — becomes bigger than the "real" economy of people doing stuff. Today, in fact, over 95% of currency transactions are made between speculators. Our money is used less for real transactions than betting.

Like most innovations of the Colonial era, centralized currency is a way to extract value from the periphery and bring it back to the center. "

A majority of the money earned under our current currency system is earned by people who don't actually do anything. As such, all this speculation is a drag on the system. Speculators just bet on various companies' ability to pay back what they have borrowed.

Thanks to interest, everyone must pay back two or three times what they have borrowed in the first place. The central bank loans money to a big bank at one rate of interest, that big bank lends to a smaller one at a higher rate of interest, and so on until it gets to the actual person or business using the money — who pays the highest rate. As a result, businesses can't be merely sustainable — they must grow. And a world accepting this economic model as reality must submit to the incorrect assumption that this is just the way things are.

The way out — as I see it — is to begin making our own money again. I'm not talking barter, but local currency. Money is just an agreement. And the more a community trusts one another, the more efficiently the moneys they develop can function. We can create units of currency based on anything; if we don't have grain, we can earn it into existence instead by babysitting, taking care of the elderly, or teaching in a charter school. Every hour worked is an "hour" of currency credited to your account.

Thanks to the current economic meltdown, a restaurant in my town called Comfort has been unable to secure a loan from the bank to expand. Instead, John the owner has turned to us. We are buying "Comfort Dollars" at a rate of 1 US dollar for every \$1.20 worth of restaurant food. So if I invest \$1000, I get \$1200 to spend at the restaurant. I get a 20% return on my investment, and — since he's paying in food — he gets money a lot cheaper than he can borrow it through the bank.

Plus, I have a reason to promote his restaurant, invest in my town, and extend the good will. Everybody wins.

Making money is that easy. You don't get it from a corporation or a bank. You make it yourself, with your friends, as you create value for one another. This is the ultimate hack in a society addicted to the market: pretend it doesn't even exist, and go about your business. ☺



Douglas Rushkoff is the author, most recently, of Get Back in the Box: How Being Great at What You Do is Great for Business, and the upcoming Life Incorporated: How a Business Plan Took Over the World, and How to Take it Back.

First Steps Towards Postscarcity: or Why the Current Financial Crisis is the End of the World As We Know It (And Why You Should Feel Fine)

Jason Stoddard

It's never easy to see your hard-won earnings disappear. When you open your 401K and see it's just lost another 30%, you think: Holy moly, there goes my retirement. Yeah, it's a natural reaction, but that doesn't mean it's the right one. We live in a world of accelerating change. Tomorrow won't necessarily look anything like today. Not even slightly. In fact, it looks to me like the current financial crisis is the first step from a scarcity economy to a postscarcity scenario.

Let's be clear on this. We're not going to wake up in a magical world where iPods and McMansions grow on trees overnight. Before that can happen, every part of today's value chain has to be overturned. Everything. Production of raw materials, transport and refining, design and engineering, manufacturing, distribution . . . even our own sense of worth. So, if today's financial crisis is the first step, where do we go from here?

LATE SCARCITY: WHERE WE ARE TODAY

Keynesian? Marxist? With derivatives and CMOs and other abstractions propping up the value of investments, neither school of thought may be entirely valid. And with global population growth slowing, we're going to have to re-evaluate the "good companies will be growing at 5% a year, forever" assumption that's been the basis of corporate valuation.

We're also already starting to see some examples of near postscarcity. Consider computers and communications. If you're willing to use a computer that's a couple of years old, you can probably find a

hand-me-down for free, and then happily talk to your friends around the world on Skype using free public wi-fi.

Or consider that in the last Depression, the main worry was simply getting enough food. Today, the marketplace is more worried about maintaining the marketing budgets of 170 different kinds of toothpaste than about ensuring that everyone has toothpaste. There's a lot of padding in the system. Couple a financial crisis with this overweight, inefficient system, and you have the stage set for the first transition to postscarcity: a comprehensive rethink of our concept of value.



TRANSITION PHASE 1: VALUE PROLIFERATION

Today, rappers sing about driving Bentleys, living in hotel-sized mansions, and drinking thousand-dollar bottles of cognac. Soon, they may be saying, "And that don't mean shit unless you got viz and virt and rep!" We've already seen the beginning of this: divorce cases in which World of Warcraft's internal currency is named as an asset; the growing importance of reputation systems such as eBay feedback; the proliferation of corporate "points" or "bux" systems that can be exchanged for real goods; the monetization of attention via friend-spamming on social networks and advertising on popular blogs. Our concept of value is expanding; it will expand even more in this phase.

Think about it. If real currency, virtual currency, corporate points, visibility, and reputation all have value, exchanges will soon

...divorce cases in which World of Warcraft's internal currency is named as an asset; the proliferation of corporate "points"... our concept of value is expanding.

crop up. Think of a FOREX (a market in which foreign currencies are exchanged) for all things we consider of value. As point examples of near post-scarcity grow and these value systems become interlocking, we'll move beyond a single monetary value system. You'll be able to live well under any number of value systems: reputation, visibility, network, rewards points, or even "old-fashioned" currency.

TRANSITION PHASE 2: UNSEEN GOLDEN-AGE

The second phase of the transition to postscarcity is the scariest, but only if you look at it from today's POV.

What's hard to accept? Well, multiple interlocking value systems require comprehensive metrics and tracking. Read: surveillance. We could easily find ourselves in a propagational economy, where a person's entire value is based on their Attention Index (their visibility to other people) and Monetization Effectiveness (how well they sell).

"Yuck," you say.

But what if advances in manufacturing efficiencies make it possible to live well, simply by interacting with friends and going about your life? What if below-replacement-level birth rates and advances in biotechnology meant you could check out of the system by claiming a piece of unused desert and planting a house? This surveillance economy might be a very easy place to live.

The end of this phase would come rapidly if Drexler-level nanomachines (molecular manufacturing) made the production of material stuff essentially free, and took the future worth of the entire value chain to zero. If it costs nothing to make the machines to find and refine the raw materials, or to grow the transportation network, two of the "insurmountable" obstacles to postscarcity disappear. Even without this near-magical technology, bioassembly and other methods will slowly erode the value of raw materials refining, transportation, and manufacturing. In either case, this is an even bigger economic rethink than the one we're going through today.

TRANSITION PHASE 3: MAGICAL IDEAS

True nanotech is limited only by the energy we put into it. In this time, unthinkable mega-engineering projects become feasible: growing

a global network for finding, refining, and transporting raw materials; producing hundreds of space elevators for easy access to extraterrestrial resources; assembling magical factories along every coastline.

In this phase: we are truly free to dream, and big ideas are the currency. The dreamers and designers who can imagine the best ways to change the world will become the "economic" giants of their time. The big issue will be how to coordinate these visions, and to eliminate or minimize disruptive ones.

This phase ends when the systems for effortless production of all our dreams are in place. Artificial intelligences or powerful semantic processing make this unlimited capability accessible to anyone. We are now free to imagine what we want — and have it delivered on demand.

TRUE POSTSCARCITY

Speak your wishes to the air and it will deliver. The seamless nanotech/biotech skeins distributed through the earth and the solar system make every wish possible. The only remaining question: where do your rights end and someone else's begin?

Now, sit back and think: even without life extension, I might see every phase of the transition to true postscarcity in my lifetime. Remember that thought the next time you check your brokerage account. It is the end of the world as you know it. And that is perfectly fine. ☺



WHY WHUFFIE IS WISER:

hacking the economy blues with social capital

TARA E HUNT

AUTHOR, *The Whuffie Factor*



I can hardly stand to listen to the radio or read the news these days. Seems that every bit of news tells me that there is no money left anywhere. Companies are laying people off and cutting back their budgets, the state of California can't afford to pay the counties who can't afford to provide services to the citizens, taxes are squeezing the middle-class and non-profits are suffering big losses in donations, which is leading to cutbacks in aid to the people who need it the most. It is as if the sky opened up and a big vacuum cleaner came along and sucked up all of the money. Top to bottom, the money is gone. It's as if money was a figment of our imagination all along and now we've awoken to find that we have to find a way to get along without it.

It is as if the sky opened up and a big vacuum cleaner came along and sucked up all of the money.

Of course, there is a financial economy and the currency we use to buy a loaf of bread or pay our rent is real. But I believe what this time period will teach us for the years to come is that money is not the only — or even the strongest — currency we have to rely on.

I was taking my dog for a walk the other day when I ran into the bar manager from next door. As we chatted, the economy came up, so I asked her how it is affecting her establishment. She told me that people were still drinking as much as ever, but they were leaving smaller tips. At first, I cringed. "That's too bad," I said, "that it has to hurt you and your staff like that."

She replied, "I don't mind, really. I want our customers to be able to pay the rent at the end of the month. I'll gladly give up a few extra dollars so we can all survive this period of time."

I was blown away by her 'we're all in it together' attitude. But this wasn't the only time I've witnessed people come together to help one another through the rough spots over the past few months. People I know who have less paid client work are spending their spare hours on helping non-profits fundraise. There is more couch-surfing going on with people I know who are traveling — I've had so many guests lately that I ran out of extra keys to my apartment. As people are feeling especially reciprocal these days, my own travel budget has been cut back while I've done my own couch-surfing with generous hosts. More and more people are using social media tools to put out calls for volunteers and find help for charitable organizations and more and more people are dipping into their savings and time to help out. Just last weekend, I put a call out on Twitter for help building kitchen cabinets for the community space I own — the help would save my budget about \$1200 of contractor time — and around 25 people showed up to pitch in. Everyone around me seems to be aligned to the 'we're all in it together' idea.

This is whuffie in action.

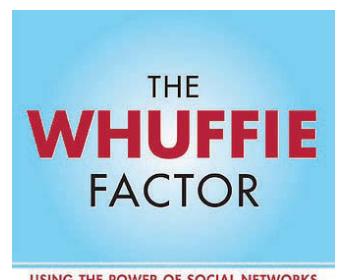


hat is whuffie? It's the currency dreamed up by Cory Doctorow in his fantastic book *Down and Out in the Magic Kingdom*. In Cory's imagined future, there is no money like we know it today. Whuffie, a digitized version of social capital, has replaced money. A person can earn whuffie by doing certain things: like helping someone out, making new friends, or creating something useful or beautiful to be enjoyed by others. One can also use earned whuffie to buy a loaf of bread or pay rent. In Cory's book, the earned whuffie points are stored in an internal computer that can be 'pinged' to get back a score — an effective way to monitor the amount of nice or notable actions a person has contributed to their community.

From there, you can figure out whether you want to associate with her based on her score. There are a few problematic details to this system, but in general, the idea is that people who do nice, notable things for the community will be taken care of.

As you may have gleaned from my account of the bar manager and many other stories above about people pulling together to get through our economic downturn, whuffie is a reality today. There are people giving the gifts of kindness, time and energy to others in the community so that we can all get through a very tough economic time. There is no tax system that can (currently) capture the amount of social capital that we are exchanging (and I hope there never will be). Sure, we aren't able to ping someone's internal computer to get back a score, but through our networks of relationships, we are able to give whuffie points to someone who has helped us along the way and remember to watch her back when she needs it. We can also tell others of her act of kindness, which will be remembered far longer than her line of credit. Our communities are growing stronger because of whuffie right now. I think we will see in years to come that the stronger currency was in us all along and nobody, not even Fannie Mae or Freddie Mac, can deregulate it.

As our bank accounts sag under the pressure of the slowed economy, our whuffie accounts are overflowing with the wealth to pull us through each day. That's why whuffie is a wiser form of currency to fall back on. You never know when you'll have a rainy day. ☺



Tara E. Hunt is the author of The Whuffie Factor

Has the Death of Money Been Greatly Exaggerated?

Joel Kurtzman
Interview

RU SIRIUS



In 1994, Joel Kurtzman — at that time a columnist and the business editor for the *New York Times* — wrote an alarming book titled *The Death of Money: How the Electronic Economy Has Destabilized the World's Market and Created Financial Chaos*. Kurtzman reported that the digitization, or virtualization, of capital was causing a disconnect from reality that threatened financial anarchy...with possible positive and/or negative results.

Given the current market crisis, I thought I'd catch up with Kurtzman. Does he believe that recent events reflect the changes he warned us about back in the mid-'90s? Is money drawing its last breath while you withdraw the last of your savings? Or is something else afoot?

Joel Kurtzman is currently Executive Director of the Milken Institute's SAVE program, focusing on energy security, climate change and alternative energy.

h+: Joel, you wrote a book about the emerging electronic economy back in 1994 titled *The Death Of Money*. Are we reaping the harvest of the electronic economy now, or is the current crisis about something else?

JOEL KURTZMAN: In 1994, as I went around the world interviewing people for *The Death of Money*, few people really understood the power of electronically linking the world's capital markets together. Computers were not ubiquitous; the Internet was nascent; and no one had invented the Blackberry. But one thing that did emerge at that time was that the mobility of money would proceed in a nearly unregulated manner and that volatility would increase. Back then, I examined all the data and saw that as markets connected, volatility rose. The curious thing, however, was this: As market volatility rose, the frequency of recession fell. It was as if the markets had become something of a shock absorber for the real economy.

What do I mean by that? In many ways, for example, some of the forces that put upward pressure on inflation now are channeled into market investments. If we did not have these massive, globally connected markets, the price of real assets would rise as money is created. Now, all that rises — with some exceptions — is the price of stocks and bonds. But those shock absorbers have their limits. In the last few years, the irresponsible use of products like collateralized loan obligations have broken down the shock absorbers. And, while it will take a little time for the system to "reset," it will reset.

In 1994, I speculated that globally connected capital markets could make the entire world rich by making capital available anywhere to anyone with a good idea and a little bit of skill. That fact has proven to be true. Since 1994, many billions of people have risen from poverty into the middle class. If China or India did not have access to global capital they would be growing at one or two percent a year, not nine or ten percent a year.

h+: In that book you also wrote, "Every three days a sum of money passes through the fiber-optic network underneath New York equal to the entire yearly output of all of America's companies and its entire workforce. And every two weeks the equivalent of the annual product of the world passes through the network of New York — trillions and trillions of ones and zeros representing all the toil, sweat and guile from all of humanity's efforts." How deep is the disconnect between the movement of conceptual money and the creation of actual wealth on the ground?

JK: We've seen something interesting happen. In 1994, I talked about the divorce between the financial economy (money) and products like stocks, bonds and derivatives on the one hand; and the real economy of goods and services on the other. In the interim period, there has been something of reconciliation. Companies like Southwest Airlines routinely use complex hedging strategies to protect themselves against price spikes and valleys with regard to fuel costs. Manufacturing companies, like Boeing and Airbus, use these same strategies to protect themselves against currency risks from managing a global supply chain while pricing their products in dollars. That's how the financial economy has reconciled with the real economy.

On the other end, with the rise of private equity, the real economy has benefited from the financial economy. Many firms that were public have become privately owned. In the world of finance, that's like taking the racecar off the track in the middle of the race to have the pit crew work

on it. Once the tires are switched, the oil is changed and the car is gassed up, the car goes back on the track. In private equity, public companies are bought by private firms where they are repaired and made more competitive. When that's done, they're sold back to the public. Private equity resembles the pit crew. That's kind of a rapprochement between the financial world and the real world. So, in my view, the disconnect has narrowed.

Since everyone's watching everyone else, and because we're all connected, it's likely that once a recovery begins it will proceed quickly

h+: In your response to my first question, you wrote, "I speculated that globally connected capital markets could make the entire world rich by making capital available anywhere to anyone with a good idea and a little bit of skill." I'd say we're not quite there yet, but it sounds like the theory of "The Long Boom." Is there perhaps a longer boom in the future? Is there the possibility of a sort of postscarcity market with almost no ceiling?

JK: Nothing moves in an uninterrupted direction forever. Least of all the markets. The markets dance an up and down polka. However, while they're dancing, they trend in a specific direction and the markets are trending up. They trend upward for a number of reasons, including the fact that money doesn't hold its value for very long. Inflation always looms. Since the markets absorb a lot of inflation's effect, they trend upward. That trend will continue unless greed becomes so pervasive that the system breaks down.

h+: How long do you think the system will take to "reset"?

JK: The financial system is not backed by anything real. It's only backed by the confidence we have in the system itself. It's the old circular argument. That's because money has been transformed into information and cut off from anything real, like gold, silver or wheat. Because money is information it is a blend made up partly of ideas and partly of sentiment. Investors are like detectives who come across clues, piece them together, and when they think the pieces fit they become wildly exuberant at having done so. In the midst of this crisis, investors are sniffing around, looking at the pieces and trying to see how they fit. Once they think they see a pattern, their emotions will take over and the markets will climb. Whoever glimpses the pattern first will make the most money. How long will it take? If a market tumbles at night in Asia, it is often followed a few hours later by a tumble in New York. In other words, since everyone's watching everyone else, and because we're all connected, it's likely that once a recovery begins it will proceed quickly.

The interesting thing with these markets is that we're all one — the people who were conservative and prudent have been hurt as badly as the fool who was overly-leveraged.

All the traditional risk models blew apart. Diversification — the cornerstone of good risk management — means nothing when everything goes down. But no risk manager was ever taught that everything would go down at once. Nobel Prizes were awarded to people who said just the opposite. ^④





**Set the Controls
for the Heart of the Sun:
Howard Bloom
on Space-Based Solar Collectors**

RU SIRIUS

There's no scarcity of solar energy...closer to the sun. The Space Development Steering Committee (SDSC), which includes such influential figures as NASA astronauts Buzz Aldrin and Edgar Mitchell, and Peter Garretson, the Chief of the Future Science and Technological Exploration Branch of the US Air Force, have recently become very vocal about advocating the development of space-based solar power collectors.

A study conducted by Air Force Research Lab veteran J. Michael Snead on behalf of the organization has convinced its members that space-solar is the only way to avoid a potential existential disaster by meeting humanity's energy needs into the 21st Century and beyond.

I interviewed SDSC founder Howard Bloom via e-mail. Aside from his role in the organization, Bloom is the author of such popular and influential books as *The Lucifer Principle* and *Global Brain*.

h+: This idea of putting solar panels in space was in circulation during the 1970s. And it probably never happened because of expense. What's happening now that makes you optimistic that we can do this?

HOWARD BLOOM: In 1970, the price of oil was \$3 a barrel. On June 26, 2008, it went up to \$140 a barrel. Today, it's down to a mere \$60 a barrel. Sixty dollars a barrel. Think about it. That's 20 times the price in 1970. And guess what? It will go back to \$140 again. And beyond.

In 1973, OPEC showed us why we needed to get off our oil addiction. It cut off our supply. We waited hours in mile-long lines for gas. Richard Nixon, of all people, called for the moral equivalent of war, a full-out crusade for energy independence. Jimmy Carter picked up the energy lance and ran with it. Then came the false morning in America under Ronald Reagan, who cut the funding Carter and Nixon had put into research and development of alternative technologies like solar and wind. And we, stupid sheep that we are, went along with him on the high ride to another oil pig-out.

This time I think the American public knows that we can't make that mistake again.

Meanwhile James Michael Snead, of The Space Development Steering Committee, is about to finish a ten-month study of our oil future. Snead is a 25-year-veteran of the Air Force

Research Lab. He is a meticulous engineer, and he knows his stuff. What does his study reveal? That even if we use every alternative energy source — ground-based solar, wind, geothermal, and wave power; even if we use every form of traditional nasty energy — shale oil, clean coal, dirty coal, and natural gas; and even if we build between 16,000 and 35,000 nuclear plants (versus the current world total of 600), we will run out of energy by 2100. Snead wants me to let you know that we will actually run out well before 2100.

So we need the normal alternative fuels — ground solar, wind, and all the rest. We need them urgently. We may also need the carbon-coughing non-renewable energy sources. Not to mention nuclear. The whole package will cost us trillions. But despite the expense they entail, all these will only boost us for roughly 20 years. Then we will slowly slide into an energy gulch. Again.

Meanwhile, you asked another very good question. What's changed technologically since Peter Glazer first gave us his space solar power visions in 1968? Everything. We went to the moon the year Glazer first gave us the space solar power concept. Since then, we've developed an entire industry based on space solar power. We just don't know it. We have a \$125 billion a year satellite business beaming radio waves, television waves, and geopositioning information down to earth. Where have the 5,000 or so satellites launched since the beginning of the space era gotten their power? The sun... using solar panels.

What else do we have today that we didn't have in 1968? Back then solar panels were only able to convert roughly five percent of the solar energy that they snagged into energy. Today, new solar panels in the lab are claiming efficiencies of 40%. And that figure will continue to rise as we build our space solar power infrastructure.

Meanwhile, we've developed dozens if not hundreds of rocket-types capable of carrying cargo into space. America has them. The Europeans have them. The Russians have them. The Chinese have them. And even India — the low-cost outsourcer of choice for low-priced everything — has them. Our obstacle? In the US, we still make these rockets by hand one at a time. Or that's my layman's understanding. But what would happen if we mass-produced them, the way the Syrians are now mass-producing short- and medium-range missiles? The price would come down.

Then there are the rockets we've got and are about to



throw away like the shuttle rockets — the ones that have carried hundreds of tons of cargo into space. Why throw those rocket designs and manufacturing facilities away? Why retire the teams that make them? Why not amortize the cost of their research and development by building more of them? Why not take advantage of economies of scale to drive their costs per launch down? And why not use them to build an infrastructure in space?

h+: I wonder about the claim that we will run out of all energy resources during this century, even the natural kind. Aren't we going to invent better technologies for collecting wind, solar and hydro? What about nuclear? Or the potential for fusion? Wouldn't making these technologies ever safer, cheaper — maybe even using some form of self-replication — be cheaper than putting big heavy material up into space?

HB: Mike Snead can answer this better than I can. He's used generous figures about the amounts of energy terrestrial sources like ground solar and wind would produce. And

he's used very conservative figures about what our energy needs will be. But you're right. Folks like Ray Kurzweil swear that nanotechnologies and other breakthroughs will produce nearly god-like increases in the amount of energy we can squeeze from sunlight falling on the surface of the earth.

I was a big booster of ground solar in its early days. With one of the members of Styx, I put together the first series of pro-solar public service radio ads in 1981. So I like ground solar. But what seems more important to me is this: to put together big-scale ground solar projects, we will have to destroy ecosystems. Many of the ground solar mega-plans I've seen require covering most of the Mojave Desert with solar panels or with solar-concentrating mirrors.

Goodbye to the lizards and to the plants that are unique to that environment. Goodbye to biodiversity and delights for the eye. More crucial — even if you put on eco-blinders, there is only so much real estate on earth you can cover with solar collectors. The sheer land is going to run out. The same is true of coal, oil, natural gas, geothermal, and even useable real estate for wind. All of them are finite. We need a source that is infinite. The only two nearly infinite sources I know of are fusion — which doesn't yet exist and which has continued to elude us for 60 years — and solar power from space.

One more detail. Even if we save energy like misers, we will have to spend trillions to increase our energy output to satisfy our own needs and to elevate the living standard of the Third World to the level you and I enjoy today. And what will we get for it? Frankly, eyesores with no additional value. There are no multiple uses — no additive benefits for miles and miles of solar panels and hills studded with windmills. What we'll get out of a vigorous space solar power program is radically different. We'll get an infrastructure in a territory where resources are stunning. The moon is an immense source of raw materials for concrete, steel, glass, and semi-conductors. Some call it The Earth's Eighth Continent. Lifting resources from the Moon's surface is inexpensive. The Moon's gravity is one-sixth of ours here on earth. What's more, asteroids are massive sources of nickel, titanium, and platinum. And comets are mobile fuel stations made of the liquid oxygen and hydrogen we use to propel space ships.

What in the world would we do with unending amounts of building materials in space? Those are the raw materials from which we can build second and third-generation space solar power satellites. And they're the raw materials from which we can build huge rotating colonies that can house 10,000 humans or more. Space is real estate. It's real estate in the sun. Every space solar power satellite we build is a part of the infrastructure of a new economy. It's a way station on the way to the stars.

And not just a way station for us. It's a way station for life, for ecosystems, and for the future of the grand experiment of DNA and cells, an experiment in need of new lands to bioform, new land — and skies — to green.

h+: I think the new paradigm with

earthbound solar collectors (and with wind), is that it would be distributed. You wouldn't so much be building huge solar farms, you'd have solar collectors pasted everywhere – (and I believe thin, sheet-like solar power collectors have already been developed...correct me if I'm wrong).

HB: Like you, RU, I'm a personal fan of distributed power systems. I suspect that, like the Internet, a highly parallel-distributed system with power generation in your home would be more blackout-proof than centralized systems. Personal power generators would also increase our sense of control over our lives.

When I first got involved in space solar power, I asked if this power could

it, charge your car, and power your office with only solar panels on your roof and a windmill above your chimney.

h+: I'm glad to see people dreaming about space colonization again. I've heard rumors that there's a resurgence of interest in these ideas at NASA. Can you confirm or comment on this?

HB: Now that the Bush mind-freeze is ending, I hear new rumors about the thaw at NASA weekly. Dreams that have been unthinkable for eight years are reviving. The presidential election is tomorrow as I type this. We'll see what impact the mix of political change and economic crash has on our ability to fantasize and to make those fantasies come true. The ability to turn fantasy into reality is at the heart of the human evolutionary process and

garbage into gold. We evolved as humans by turning hostile environments to advantage. We evolved as humans by finding ways to live on the edges of Ice Age glaciers and on the fringes of deserts. We evolved by outfoxing 60 freezes and 18 periods of massive global warming. Today we have a new frontier whose potential is larger than any hostile horizon we've ever conquered before. It's a new frontier not just for human beings but also for entire ecosystems — for meshes of living beings from bacteria and algae to trees, cats, and puppies. It's a massive niche waiting to be greened. And we are the only beings on this planet that can reach it. We are the only ones who can green it. That vast new landscape hangs above our head. ☺

Every space solar power satellite we build is a part of the infrastructure of a new economy. It's a way station on the way to the stars.

be distributed. That is, could the city of Milwaukee have its own space solar power satellite? Could the kids in Buffalo, NY (my home town) chip in ten dollars each — the way we did when I was a kid to build our first big-league sports team, the Buffalo Bills? And could we use our pooled greenbacks to get our own satellite? The answer I got was yes.

Then there's distributing the power. Space solar power can be beamed down to remote locations, electrifying distant villages in Asia and Africa that are very hard and very expensive to reach by the traditional wiring systems we have in North America.

But my suspicion — from James Michael Snead's Space Development Steering Committee study — is that it would be very difficult to electrify your house, heat

at the cutting edge of nature's techniques for creation. Its revival — whether here, in China or in India — is a necessity.

The bottom line is this. We have to bring space to life by bringing life to space. Economies go through mega-crashes roughly once every 70 years. It's been that way since the tulipmania crash of roughly 1637. What lifts economies from those massive falls? New frontiers, new resources, new technologies; new ways to turn toxic wastes into energy and new techniques that turn



5 PATHS TO UNLIMITED Renewable Energy

JAMAIS CASCIO



A 2007 MIT study argued that hot rocks geothermal could meet a significant percentage of US energy demand — in principle, up to 100% , ,

If you were trying to design an energy system for a rapidly growing population, it would be hard to do worse than the one we have today. It's brittle — dependent upon unstable regions and massive centralized networks. It's dirty — poisoning us with mercury and heating the atmosphere with carbon. And it's finite — we're perilously close to running out of one of our key energy resources, oil. Getting away from all of this won't be easy, and we're running out of time to make it happen.

But there's also good news: We know exactly what we need to do to get out of this mess, and we have all of the necessary tools at hand.

We're at the cusp of a massive transition, from the era of limited, subtractive energy resources to the era of unlimited, renewable energy. For a variety of reasons, we've long relied upon energy resources that have finite quantities, and once used, leave us stuck with (often deadly) waste products. These resources were easy to find and cheap to use, but — from a long-term perspective — were never really more than bootstrap technologies, allowing us to get to the point where we could shift to energy resources that are functionally limitless, and entirely renewable. That point is here.

The initial set of transition technologies are undoubtedly quite familiar to you: massive wind turbines, collected in wind farms covering hundreds of acres; solar panels on rooftops and in the desert; and the granddaddy renewable technology, hydroelectric generators in dams and waterfalls. All useful and important, but very 20th century. The next wave of renewable energy technologies are all about getting away from the old-style centralized grid and embedding energy generation into all aspects of our lives.

WIND: GO FLY A KITE

Gone are the mega-towers and spinning blades. Say hello to the age of kites.

On the land, higher-altitude wind power, using kites flying at a kilometer or higher, can generate eight times as much power as traditional wind turbines (and going higher, up into the jet stream, can be even better). Kites have a couple of advantages over traditional turbines: The wind is steadier at higher altitudes, and kite-based wind power can be more readily integrated into dense environments. A set of kites can produce about a gigawatt of power in the same space required by an old coal or nuclear plant.

On the sea, diesel cargo ships outfitted with kite sails can cut fuel consumption by up to 50%. A German company, Sky Sails, has already outfitted two cargo ships as test vehicles. The ships remain in commercial operation, and the preliminary reports have been quite positive.

Proximity: On land, next decade. On sea, next five years.

Prognosis: Shipping companies will jump on this; land-based power companies may be harder to convince.

GEOOTHERMAL: WE'RE GENERATING STEAM HEAT

Geothermal energy might conjure images of geysers, hot springs, and Iceland. But the cutting edge is with engineered geothermal, taking advantage of the natural geological heat available just about everywhere (no nearby volcanoes required). Also known as "hot rock" geothermal, the process pumps water to around five kilometers underground, where the pressure keeps temperatures high. It turns out that the costs aren't all that high for setting up an engineered geothermal generator, and that the system can even be used for limited carbon sequestration.

What could it offer? A 2007 MIT study argued that hot rocks geothermal could meet a significant percentage of US energy demand -- in principle, up to 100%.

Proximity: Possible now, but probably five to ten years from serious testing.

Prognosis: Could end up being the replacement "base-load" power for areas using a lot of intermittent wind and solar.

SOLAR: FLEXIBLE AND UBIQUITOUS

Glass-plate solar panels, using silicon or germanium, remain the highest-efficiency solar power technologies. Unfortunately, these panels are still typically big, brittle, and expensive. But a real solar breakthrough is just around the corner — and will come not through efficiency, but through ubiquity, driven by both reduced costs and wider applicability.

Welcome to the world of flexible solar. Flexible plastic photovoltaics and paint-on solar dyes will allow previously non-energy-producing surfaces — such as walls and windows — to become micro-sources of power. New production techniques, such as those developed by Nanosolar, get away from glass plates, and can cut production by 90%, immediately making solar competitive with even cheap coal power. On the horizon, carbon-nanotube solar promises to add energy production and storage to nearly any manufacturing material.

Proximity: Possibly this year, but last-minute glitches may mean an early 2010s emergence.

Prognosis: The technology is coming together, but the real question is how long it will take product, building and urban designers to take advantage of the new materials.

HYDROKINETIC: THE MOTION OF THE OCEAN

Hydrokinetic power is undoubtedly the dark horse energy technology. Despite studies from energy think tanks showing that it could provide upwards of 30% of power needs in seaside nations, cleanly and at low cost, few people have heard of it. But wave power is already starting to... well, make waves.

Simply put, hydrokinetic power turns the regular, predictable motion of waves, tides and currents into electricity. Some designs just bob up and down, while others act like undersea wind turbines. One design, still in its early stages, takes advantage of a technology developed for Cold War submarines — the magnetohydrodynamic drive — to produce potentially vast amounts of power. And most of these aren't just engineering prototypes — working wave power systems are now being deployed along the Oregon and Portuguese coastlines, delivering hundreds of kilowatts of power — with more to come.

Proximity: It's here. Get used to it.

Prognosis: Funding for it remains low, so it will take awhile before people really notice its potential.



MOTION: SHAKE YOUR BODY

Perhaps the most surprising emerging source of power is you. Yes, you, sitting there. Well, not when you're sitting there, but when you're out and about, walking and even dancing. And not just you — anything that moves, from bridges to trees to buildings — could be used to produce power from the motion.

The technologies used to do so vary considerably, from piezoelectric materials generating electricity from pressure, to wobbling microgenerators, to small flywheels spun by moving magnets. In most cases, the amount of power generated is small, but that's fine if what you're trying to power are microsensors, bio-monitors, or — if you're really working at it — MP3 players. But floors that generate power from people walking on them (through piezoelectric materials or magnetic coils), now used in a variety of facilities from dance clubs to fitness centers, can produce up to 60% of a facility's power needs, just from people doing what they came to do.

Proximity: Slowly being deployed.

Prognosis: Will designers and architects begin to think of floors as power sources? They should.

GETTING FROM HERE TO THERE

Few of these energy technologies offer a drop-in replacement for old-style coal plants and aging nuclear reactors. That's okay — they don't need to. The future of energy isn't in a centralized power grid, but in a loose, distributed network where buildings, vehicles, even people can be both power producers and power consumers. Solar walls and windows, power-generating floors, and neighborhood power kites don't add up to living off-grid — they add up to becoming the grid. The big energy production sites, even the wind farms and solar panels, are likely to evolve into the backup to the distributed power network.

The advantage of distributed power comes down to resilience. As we've seen across a variety of systems, big, tightly linked, highly centralized systems can still fail, and when they go, they go catastrophically. Loosely interdependent, distributed systems tend to have more redundancy and flexibility, and can more readily withstand unexpected shocks.

Fortunately, the energy technologies within our grasp will fit into a distributed grid quite nicely. A good thing, too — it's likely we still have quite a few big shocks ahead of us this century.

It's almost as if the ancient philosophers had it right: it all really comes down to air, earth, fire and water — and maybe a bit of dancing. ☺

RESOURCES

Fly A Kite

<http://www.newscientist.com/article/mg19826562.000-to-make-the-most-of-wind-power-go-fly-a-kite.html%E2%80%9D>

Sky Sails

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Hot Rock Geothermal

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*"We are called to be architects
of the future, not its victims."*

-R. Buckminster Fuller

*"If we all worked on the assumptions
that what is accepted as true
is really true there would be
little hope of advance"*

-Olivia Wright

What Do We Do About **Water?**

GIL FRIEND

Water.

The old buzz: "Water, water everywhere, and not a drop to drink."

The new buzz: "Water is the next carbon." Meaning that as business and society are beginning to get into serious gear about carbon emissions and climate change (or at least beginning to make serious noise about doing so), there's a growing realization that there may be a cascade of crises patiently waiting to mash themselves into our consciousness the moment we come up for air from the carbon crisis.

What's the problem?

Rising populations, coupled with industrialization and urbanization, have driven up water demand through the world. Most of the world's leading grain producing countries are already in water deficit — and demand is still rising.

Only 3% of the world's water is fresh water; only 0.3% of that is surface water. 30% is in ground water, which is being treated like a fossil resource and being mined faster than it is replenished. In addition to quantity, there's the matter of quality. We need clean water, and most people alive today don't remember a time when it was safe to drink from rivers and streams. Industry needs clean water too.

And then there's energy. It takes energy to move, heat, cool and treat water — about 19% of California's electricity budget, for example. And it takes water to create energy — to cool power plants, etc. In fact, during the heat wave of 2006, France had to power down several nuclear reactors because river water was too warm to effectively cool the plants. And, of course, there's the potential impact of climate change on both water supply and demand. Oh what a tangled web we weave...

But there's a critical difference between energy and water. We can substitute our way out of the energy crisis. Petroleum may be dense and convenient, but we don't have a committed relationship with it. As soon as another energy source does the job better and cheaper, it's "sayonara Saudis." The Stone Age didn't end because we ran out of stones, Sheikh Zaki Yamani wisely observed, and the Petroleum Age won't end because we ran out of oil.

But we can't substitute our way out of the water crisis. Water is the stuff of life, and there is an irreducible minimum below which life is not sustained. So we have to get smart about water.

What are the solutions?

The basic answer is "doing more with less," as Bucky Fuller was fond of saying. Water efficiency — and even radical water efficiency — is in our futures, and we'll achieve it in three ways. Let me summarize them: sexiest first, most profitable last.

Technology is the most exciting option, since we're both dazzled by cool new things and organized around making money from them. The catalog here is diverse. It includes low-flow fixtures like faucets (down from 2.2 gallons per minute just a few years ago to 1.2 gpm today) and toilets (down from 1.6 gallons per flush to 1.28) and waterless toilets (like the urinals you're starting to see in office buildings that save 40,000 gallons per year each, at a return on investment (ROI) of 14% per year). (As always, your mileage may vary.) It includes hyper-efficient pumps and motors like the turbines and impellers from the Pax Group, inspired by nautilus shells and other biological solutions; and low-energy filtration technology using carbon nanotubes, which will pass water molecules — but not viruses, bacteria, toxic metal ions, and large noxious organic molecules — through their smooth, water-repellent interiors.

But as with the reduce/reuse/recycle hierarchy in waste management, this is the third step in the process, since investment will be more productive if there's a smaller flow for it to manage.

The second major lever: pricing. As with many key resources, prices are often distorted by policies, whether they be historic legacies or decisions to suppress prices to expand access (incorrectly priced resources incent people to overuse). Conversely, lifeline rates can provide access to basic supplies at a modest price, while escalating rates for higher usage tiers provides incentive to efficiency. Watch for both variable water pricing and challenges to historic water subsidies.

Behavior change, the third lever, is both the easiest — because it requires no investment, no complex change in infrastructure, no lag time — and the hardest, because it depends on people changing habits. It's also the least glamorous. It's as simple as not running the water when you brush your teeth or wash the dishes; not over-watering your lawn; or (a bit harder) encouraging your employees to notice and change how they clean a production line.

Water utilities around the world are investing heavily in efficiency technology and education, because they find it a much more economically effective investment than building new supply infrastructures.

Finally, some of the most interesting technology doesn't fit in the normal "clean tech" taxonomy, since it's more about systems and processes than things. My favorite example is the TREES program in Los Angeles. LA's rainfall would deliver half its water budget, but 75% of LA is paved, so most of that rain runs off to the sea — and at that, only after running through, and burdening, the city's water treatment plans. The TREES uses technologies — from permeable paving that captures rainfall to forestation programs that provide massive water storage in the root zone of trees — that mimic the "sponge and filter" function of forests and demonstrate the feasibility of retrofitting a city to function as an urban forest watershed. The program has already saved the city \$200m — and according to projections, it will cut water imports by up to 50%, create up to 50,000 jobs, remove the 100 year flood threat on the L.A. River, and eliminate the need for a \$4 billion treatment plant. Now that's cool refreshing technology. ☺

RESOURCES

Water Cycle
<http://ga.water.usgs.gov/edu/watercyclefreshstorage.html>

Hyper-Efficient Pumps
<http://www.thepaxgroup.com/technology/>

Nanotech Filtration Technology
<http://news.smashits.com/295383/Nanotechnology-may-solve-water-crisis-in-India.htm>

The TREES program
<http://www.worldchanging.com/archives/003674.html>



Be More Than You Can Be in the New Enhanced Army

WOODY EVANS

US Military culture is famously weird (to civilians), and infamously efficient at fueling our war-making organizations. With the exception of melodramatic and shallow takes on warrior's rituals as presented in popular media, the culture is largely closed to civilians, and very dear to the men and women in uniform. Even the very modern rites and rituals of warriors have roots that can be traced back hundreds or thousands of years.

The tradition of single combat, for instance, is still alive in the "grudge matches" of US Army Infantrymen. The sometimes lethal hazing of sailors "crossing the line" (equator) in the 1800s has meandered into gentler forms of pollywog abuse, often involving Jell-O or cheese... and bare-bellied Chief Petty Officers.

The new network-centric warriors of the post-Rumsfeld era live in a military culture that straddles the traditions between yesterday and the techno-savvy warriors that they are expected to become for tomorrow's conflicts. The tools that today's warriors now must use edges them closer, individually and collectively, toward a transhuman state. This practical instantiation of (some of the grosser elements of) transhumanism still runs aground of the older military mindset and culture. How do you maintain a strict hierarchical chain of command in an organization moving toward the valuation of a networked ethos? Let's look at some of these likely hotspots for cognitive dissonance, and consider their effects.

INFORMATION WORTH KILLING FOR

One of the most hotly sought and traded coin in the .mil culture is free and open non-classified metadata sharing. Military movers and shakers are seeking and using information generated by civilian non-profits, corporations, or government agencies to solve problems like food distribution in the Irrawaddy Delta post-Nargis; relationships between income and disease vectors in Asadabad; or the creation of smart firebreak patterns in SoCal. The realization that much mission-essential information has been created and published online, to be shared freely, by non-military groups, is a profound point with serious reverberations throughout military and allied organizations. It brings up questions about the possibility of operational inference by "free and open" info-sharing allies.

But there is also, very naturally, a less hippie-cum-latte, more aggressive side to military information management. Personal x-ray devices for seeing through mud walls and concrete bunkers, forced synaesthetic abilities (like the Navy SEAL who sees bodies in the water by tasting the saltwater with his cybergear), pocket-sized forward entry devices (PFEDs) for coordinating air strikes with infantry rushes, networked night-vision monocles, and other person-level information tools bring technology into near-embodiment onto — and within — the soldier. Sharing of this tactical data is strictly intranet, and its use is not usually as humane as the work of an anthropologist in a Human Terrain Team trying to figure up the best route to run a sewage ditch.





SANCTIONED ACTION

Chain of command is based on top-down hierarchies in which information and actions are strictly controlled by commanders on the chain. In a network-centric military, information moves much more quickly, and therefore actors lower on the chain are often more informed (or informed more quickly) than their superiors. As a result, rapid actions with no direct sanction are the norm. Enter "swarming," which is an algorithmic way to design actions and build-in sanction without the constant and immediate presence of command. Brian Friel, in his Spring 2002 *Government Executive* article, "Hierarchies and Networks," describes it as everyone knowing their job, like on a football team — but the moment the ball is in the opposite team's hands, every team member breaks loose and runs them the hell down.

In Alexander Kott's book, *Battle of Cognition: the Future Information-Rich Warfare and the Mind of the Commander*, Richard Hart Sinnreich, former Director of the Army's School of Advanced Military Studies, writes about the temporal "compression" that happens in today's engagements: attacks "begin more precipitately, transpire more rapidly, and terminate more abruptly than they have for centuries." In such a world, dated information is deadly. Commanders must allow unmediated decisionmaking whereby the swarm, perhaps a squad or a platoon (10 to 50 warriors or so), stays with the prescribed duty up to the point they eyeball the enemy. Then, all at once, and in some variation on a well-drilled choreography, they kill the bad hat with the ball. There's your tactical agility. There's your post-network pack of lions.

GENDER, MIND ALTERATION, AND EVERYTHING ELSE

Gays in the military. Lesbians in the shipyards. Lesbians who used to be men working the galley: yummy stuff, comrades. As the physical distinctions between men and women grow fuzzy through technology and technique, so do the psychological, sociological, and cultural roles of men and women. Because warrior culture relies on very clearly defined gender roles, it will be an important transhuman proving ground for gender modification and alteration. Military relationships are overwhelmingly about trust — and it's hard for most to trust another sailor if you can't even tell "what" s/he is. If we have the right to change our gender, to take things even further, maybe we have the right to change our minds neutraceutically or entheogenically. All this opens the possibilities of identities and behaviors that would have traditionally been seen as difficult to manage and useless in wartime. You've got to know them to trust them. It's hard to know or trust them when they're all mercurial and post-identity. But, in for a penny we are, and the use for the tools has the requisite built-in buy-in to the ethos of their use. Our tools change us, and the same is true for the tools that warriors use. Networks are changing command sequences. The wider suite of traditional "transhuman" interests, like information technology, will change military culture.

The future of the military is in the hands of tomorrow's geek-kids playing Kdice and Tower Defense games, swilling their taurine.

.MIL HEADS WITH DECISIONS TO MAKE

It is clear that technology is changing people — physically, mentally, and (most pertinent here) culturally. We can't see where we are going, and the military, for all its operative intelligence, is driving forward while looking in the rear view mirror (to borrow a line from McLuhan) like all the rest of us. But well-moneyed militaries (and guerrillas) have an opportunity unlike any other group on Earth to create unparalleled destruction and chaos. Most of us grew up in a nihilistic-nuclear-freakout kind of world, and the idea of mechanized auto-extinction is nothing new to mankind in 2009. Perhaps it is through the adoption and mutation of elements from a transhuman world that the military powers may become something altogether new and different. The shape of what it becomes will be determined by whether — and to what extent — the need for organized aggression and defense exists in a post-human world.

But the network, the technology, its deployment, and its embodiment — these all have their vulnerabilities too. In fact, they may attract attack. According to Thomas K. Adams, author of *The Army After Next: the First Postindustrial Army*, the "criticality and vulnerability" of lightweight relay/transmission vehicles make it "worth considerable effort" to take out these (often mission-critical) nodes in the network. Whether or not the strengths of networks will counterbalance their emerging weaknesses is a very big question. Maybe we'll answer it before the Singularity, and if not, who'll be around to give a damn anyway? Imagine "terrorism" dripping from our nostrils in the form of black goo — pirated neural nodes fatally overrun by malware. Evolving with the viruses may cost more lives than we're willing to offer up.

As new strengths and weaknesses develop and establish space in the minds of commanders and their marines, airmen, sailors, and soldiers, new twists on old ways of establishing dominance and trust are likely to develop in the warrior cultures. Grudge matches become *Guitar Hero* beatdowns. Torpedo Juice drinking games get spiked with HGH. And as genders, machines, and genes get blurred beneath the uniform, "crossing the line" rituals take on new dimensions.

The future of the military is in the hands of tomorrow's geek-kids playing Kdice and Tower Defense games, swilling their taurine, and figuring out what it means to be a man in a world gone Emo. They will be the ones hugging the inside track as they speed along the curve toward Singularity. They will be the networked warriors who understand Al Qaeda well enough to, finally, burn it completely from the face of the Earth. ☺

Nanotechnology, for Better or for Worse

Mike Treder

When K. Eric Drexler popularized the word 'nanotechnology' in the 1980s, he was describing what we now call molecular manufacturing: building machines on the scale of molecules, a few nanometers wide — motors, robot arms, and even whole computers — far smaller than a cell. Drexler spent the next ten years describing and analyzing these projected advances, and responding to accusations that his ideas were science fiction.

Meanwhile, chemists and biotechnologists were developing the ability to build simple structures on a molecular scale. As nanotechnology became an accepted (and well-funded) concept, the meaning of the word broadened to encompass these simpler kinds of nanometer-scale technologies.

Most of the current work that carries the label 'nanotechnology' is not nanotechnology in the original meaning. It is, instead, a set of related fields making use of properties unique to the nanoscale, so that factories can

produce nanofibers that are added to fabrics to increase stain-resistance, or nanoparticles that go into cosmetics to improve absorbency, or coatings for glass to keep it cleaner longer. All of these are arguably valuable, but none are especially revolutionary.

A useful way to think about the difference between today's nanotechnology and tomorrow's molecular manufacturing is that the former uses big machines to make small products, while the latter will use small machines to make big products. Similarly, nanoscale technologies bring only incremental advances in product performance, while molecular manufacturing will offer powerful new products and spectacular, revolutionary benefits. On the downside, while nanoscale technologies bring only familiar risks related to chemical toxicity, molecular manufacturing will introduce a whole new class of unfamiliar problems. The current issue of *h+* is devoted to "solutions" offered by emerging technologies. I've titled this column "For Better or For Worse" because for every exciting solution molecular manufacturing might deliver, there is an equal and opposite negative challenge to be overcome.

Nanotechnology is sometimes referred to as a "general-purpose technology." In its advanced form, it will have significant impact on almost all industries and all areas of society. It will offer better-built, cleaner, safer, and smarter products for the home, for communications, for medicine, for transportation, and for industry in general.

Like electricity or computers before it, nanotechnology will offer greatly improved efficiency in almost every facet of life. But as a general-purpose technology, it will be dual-use, meaning it will have commercial uses and also military uses, making far more powerful weapons and tools

of surveillance. Thus it represents not only wonderful benefits for humanity, but also grave risks. On the positive side, we can look forward to the development of new infrastructures for clean, inexpensive power, with the emphasis likely to be on solar energy.

RESOURCES

What Is Nanotechnology?
<http://crnano.org/whatis.htm>

Benefits of Nanotechnology
<http://crnano.org/benefits.htm>

Dangers of Nanotechnology
<http://crnano.org/dangers.htm>

Today's solar collectors are not as efficient as desired and they degrade rather quickly, making the industry only marginally able to compete economically. But atomically precise manufacturing should enable far higher rates of conversion of solar energy from sunlight to electricity.

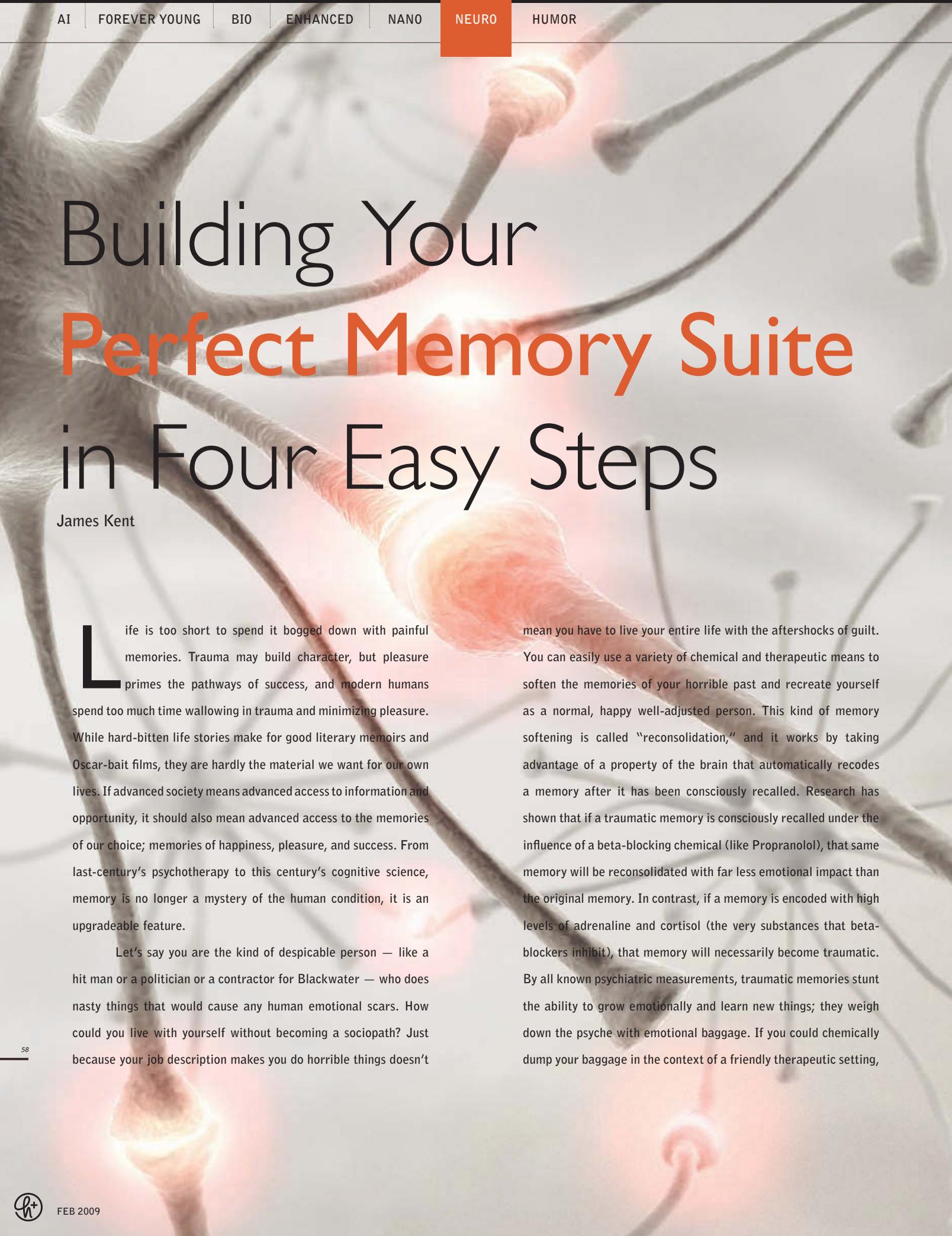
Many experts believe that molecular manufacturing will make access to outer space far easier and less expensive than in the present day. Predictions are that we should see the costs of space access drop as low as 10% of what they are now, or maybe even 1%. Building large solar collectors in space offers the promise of abundant low-cost energy, while the technology also opens up the possibility for practical and productive mining of the asteroids. Of course, there is the worry that such ready access to space may lead quickly to the spread of a nano arms race into orbit. That's one clear example of nanotechnology's better-worse dynamic: will the opening of new capabilities in space lead to abundant sustainable energy for all, or will it be diverted into dangerous military conflicts?

The same technology that could provide trillions of dollars of abundance also could trigger a vicious scramble to own everything, pitting powerful corporations and governments against one another. The same technology that could provide networked computers for everyone in the world also could be used to make hundreds of billions of dust-mote-size networked cameras so governments are able to watch our every move. The same technology that could provide lifesaving medical robots to enter the bloodstream and destroy cancerous tumors, repair tissue damage, or clean out clogged arteries, also could be used to produce millions of tons of untraceable weapons of mass destruction.

Will you take nanotechnology, for better or for worse? 

Mike Treder, executive director of the Center for Responsible Nanotechnology, is a professional writer, speaker, and activist with a background in technology and communications company management.





Building Your Perfect Memory Suite in Four Easy Steps

James Kent

Life is too short to spend it bogged down with painful memories. Trauma may build character, but pleasure primes the pathways of success, and modern humans spend too much time wallowing in trauma and minimizing pleasure. While hard-bitten life stories make for good literary memoirs and Oscar-bait films, they are hardly the material we want for our own lives. If advanced society means advanced access to information and opportunity, it should also mean advanced access to the memories of our choice; memories of happiness, pleasure, and success. From last-century's psychotherapy to this century's cognitive science, memory is no longer a mystery of the human condition, it is an upgradeable feature.

Let's say you are the kind of despicable person — like a hit man or a politician or a contractor for Blackwater — who does nasty things that would cause any human emotional scars. How could you live with yourself without becoming a sociopath? Just because your job description makes you do horrible things doesn't

mean you have to live your entire life with the aftershocks of guilt. You can easily use a variety of chemical and therapeutic means to soften the memories of your horrible past and recreate yourself as a normal, happy well-adjusted person. This kind of memory softening is called "reconsolidation," and it works by taking advantage of a property of the brain that automatically recodes a memory after it has been consciously recalled. Research has shown that if a traumatic memory is consciously recalled under the influence of a beta-blocking chemical (like Propranolol), that same memory will be reconsolidated with far less emotional impact than the original memory. In contrast, if a memory is encoded with high levels of adrenaline and cortisol (the very substances that beta-blockers inhibit), that memory will necessarily become traumatic. By all known psychiatric measurements, traumatic memories stunt the ability to grow emotionally and learn new things; they weigh down the psyche with emotional baggage. If you could chemically dump your baggage in the context of a friendly therapeutic setting,

wouldn't you? Or would you rather live your life with the emotional scars of a damaged character?

Now let's assume your whole life has been a walking train wreck of bad luck and bad memories from Day One. Instead of drinking yourself to oblivion (which only temporarily erases memory), why not try a complete memory makeover? You could start by selectively erasing bad memories using reconsolidation techniques in the presence of an inhibitor that blocks the protein synthesis responsible for memory; this would result in the kind of memory tinkering made famous in the movie *The Eternal Sunshine of the Spotless Mind*. This process is not as difficult as you might think; memory formation relies

you. Let's say you needed a total memory redo so you can start building new memories from scratch. You're in luck, because there is new evidence demonstrating that all your long term memory can be wiped out with a single local application of a protein kinase C (PKC) inhibitor, such as protein kinase M zeta (PKMzeta). When PKMzeta is applied to rats their long-term associative memories vanish rapidly and they exhibit all the signs of irreversible amnesia, which means the protein kinase C isoform is essential to the proper maintenance of long term memory on a daily basis; block it long enough and your memories spontaneously vanish. With PKMzeta, you may be able to permanently dump your entire memory history in a single

session that lasts less than a few hours, an interesting notion for those of us who wish we could start life over as someone new.

If you are considering radical memory intervention, it is always helpful to make a list of the new memories you want to imprint. Even though false memory imprinting is considered an unwanted side-effect of hypnotherapy – leading to many convoluted unproven claims of sexual abuse and abduction that were “recovered” from botched hypnotic sessions – this same technique can be used to imprint an entirely new set of life memories onto a receptive mind. While there is still controversy in the psychiatric community over the validity of false memory syndrome, the

method for imprinting false memories is well understood. To imprint a false memory all you have to do is put the subject in a trance state (hypnotize them), plant the memory through suggestion, and then get the subject to accept and internalize that memory as part of their larger life story. When the subject is brought back out of the trance state, they will be able to talk about their new memories and fill in all the fine details for themselves; you would be surprised how readily the brain can fill in memory gaps and rationalize paradoxical memories all in the service of building a more fully realized ego. The memories don't actually need to be true; they just need to be the ones you want. And don't worry if you pick a memory that you don't like, you can always have it erased and start over from scratch later. ☺

With PKMzeta, you may be able to permanently dump your entire memory history in a single session that lasts less than a few hours.

on a chain of genetic instructions in the hippocampus propagated by the interaction of calcium and proteins from the myosin Vb gene (MY05B) at or near the neural synapse. This interaction is set in motion by hormonal responses to stimulus, both immediate and recalled, and if a memory is recalled while the myosin Vb synthesis is disrupted, there goes whatever memory you try to recall. Fade to black.

But say memory softening or even selective memory deletion isn't enough for

James Kent is the former publisher of *Trip* magazine and editor of *DoseNation.com*. Additional reporting by David Perlman.

RESOURCES

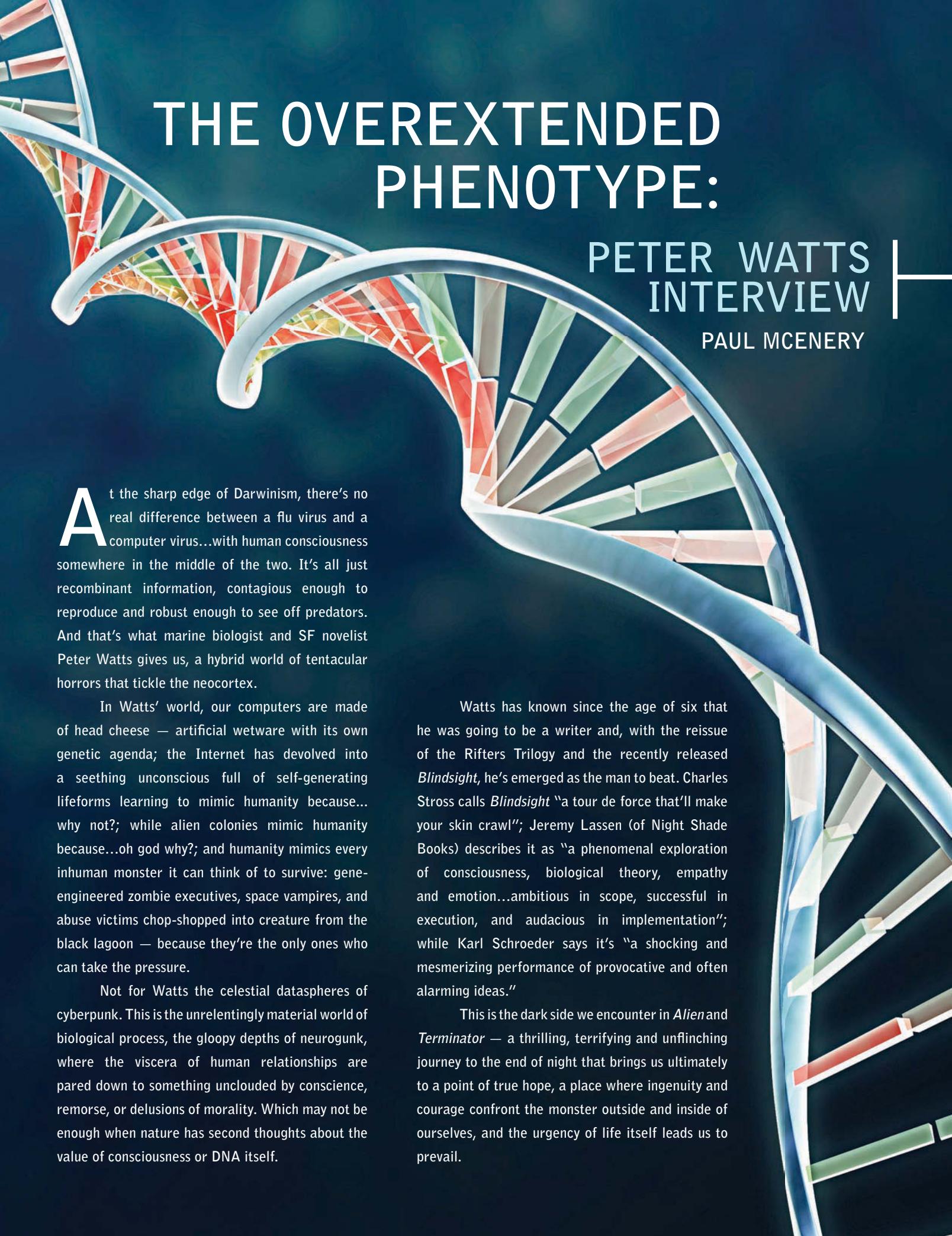
Propranolol and memory reconsolidation
<http://clinicaltrials.gov/ct2/show/NCT00611871>

Protein synthesis and memory reconsolidation
[http://www.cell.com/neuron/abstract/S0896-6273\(02\)01001-2](http://www.cell.com/neuron/abstract/S0896-6273(02)01001-2)

Myosin Vb and memory formation
<http://www.hhmi.org/news/ehlers20081031.html>

Rapid Erasure of Long Term Memory
<http://www.sciencemag.org/cgi/content/abstract/sci;317/5840/951>

Planting False Memories is Easy
<http://www.post-gazette.com/healthscience/20030217woods0217p5.asp>



THE OVEREXTENDED PHENOTYPE:

PETER WATTS INTERVIEW

PAUL MCENERY

At the sharp edge of Darwinism, there's no real difference between a flu virus and a computer virus...with human consciousness somewhere in the middle of the two. It's all just recombinant information, contagious enough to reproduce and robust enough to see off predators. And that's what marine biologist and SF novelist Peter Watts gives us, a hybrid world of tentacular horrors that tickle the neocortex.

In Watts' world, our computers are made of head cheese — artificial wetware with its own genetic agenda; the Internet has devolved into a seething unconscious full of self-generating lifeforms learning to mimic humanity because... why not?; while alien colonies mimic humanity because...oh god why?; and humanity mimics every inhuman monster it can think of to survive: gene-engineered zombie executives, space vampires, and abuse victims chop-shopped into creature from the black lagoon — because they're the only ones who can take the pressure.

Not for Watts the celestial dataspheres of cyberpunk. This is the unrelentingly material world of biological process, the gloopy depths of neurogunk, where the viscera of human relationships are pared down to something unclouded by conscience, remorse, or delusions of morality. Which may not be enough when nature has second thoughts about the value of consciousness or DNA itself.

Watts has known since the age of six that he was going to be a writer and, with the reissue of the *Rifters* Trilogy and the recently released *Blindsight*, he's emerged as the man to beat. Charles Stross calls *Blindsight* "a tour de force that'll make your skin crawl"; Jeremy Lassen (of Night Shade Books) describes it as "a phenomenal exploration of consciousness, biological theory, empathy and emotion...ambitious in scope, successful in execution, and audacious in implementation"; while Karl Schroeder says it's "a shocking and mesmerizing performance of provocative and often alarming ideas."

This is the dark side we encounter in *Alien* and *Terminator* — a thrilling, terrifying and unflinching journey to the end of night that brings us ultimately to a point of true hope, a place where ingenuity and courage confront the monster outside and inside of ourselves, and the urgency of life itself leads us to prevail.

h+: From a marine biologist, you might expect a finger-wagging warning, but instead it's more like you're gleefully excited. End of the World, Ma!

PETER WATTS: You're perhaps to first to remark upon me being "gleeful" (although interestingly, others have assumed I'm some kind of snuff fetishist based on my depictions of sexual torture). But what excites me is life fighting back —the possibility of uprising: an environment that pushes back against the self-righteous cancer that's been shitting on it since the Industrial Revolution; sheep pushed past some elastic breakpoint, sinking their teeth into the throats of their oppressors.

h+: How much does the world in your books come from your own life?

PW: Pretty much all the gut-level underwater ambience was informed by my own diving experience. There are times when you're about 60-80 feet down and the whole ocean just suddenly goes dark around you. The first thing your brainstem thinks is that some big fucking predator has just blocked out the sun, and the moment you roll over you're going to see the hemstitched zigzag grin of a transient killer whale opening up to bite you in half.

I set *Starfish* at a hydrothermal

vent because I'd been having dreams about those places ever since they were discovered in the Seventies. I put armor-eyed Lenie Clarke down there because I was trying to figure out a girlfriend of mine before she offed herself, basically. It was a simulation model iterating around romance with the self-destructive. And those two elements came together to form a major thematic subtext of the whole trilogy, which is: civilization is built on the backs of its outcasts.

h+: So the traumatized by nature and nurture are the best men and women for the job of handling the future — which sounds like a lot of scientists, not to mention science fiction fans. Honest observation or shameless pandering?

PW: Spend enough time in academia and you see this time and again. The well-adjusted overachiever exists, but she's a rare bird; most of the people who warrant the giant grants are eccentric at best and completely fucked in the head at worst. These are the people who cure the diseases, and invent the microwave ovens — and you probably wouldn't be caught dead inviting any of them to your New Years' parties. *Starfish* is kind of an in-your-face metaphor for that.

Those people are fucked up in (and by) the social environment that shaped them, which just happens to have pre-adapted them for the completely different environment that they're now in a position to inhabit. I just cranked up the dysfunction to eleven, and waited to see what would happen.

But *Blindsight* doesn't posit a crew of rejects and outcasts; they're an A-Team at the top of their respective fields.

We baselines may regard them as dysfunctional because we don't live in their civilization, but they do just fine

in the late-21st Century circles they move in. They do a lot better than we would. From a purely pragmatic perspective, I chose them to illustrate the theme; each character illustrates an aspect of consciousness relevant to the overall argument. But again, why regard them as evolutionary blind alleys? These folks are supremely adapted to their habitat; to regard them as blind alleys because they wouldn't be the life of the party in 2009 is a bit like describing a fish as ill-adapted because it can't breathe air.

h+: You seem to be asking, in *Blindsight*, if consciousness itself is a blind alley, and the enemy of humanity, if not life itself. Is it?

PW: If you define us as the little homunculi behind the eyes that says I am, then no: consciousness is not the enemy of humanity because consciousness is humanity. But then again, no tapeworm is going to argue that it is a threat to the body it inhabits, and should therefore be exterminated. *Blindsight* didn't start out as a radical stand on the maladaptiveness of consciousness. I'd just spent the better part of a decade musing over what consciousness might be good for, and I kept coming up blank. Also, the more I looked at it, the more

We baselines may regard them as dysfunctional because we don't live in their civilization, but they do just fine in the late-21st Century

consciousness seemed to cost: it's an energy hog metabolically, and it's slow as constipation. Finally I threw in the towel. Imagine my surprise when papers started coming out explicitly concluding that consciousness is just a side effect of the way the brain works, with no adaptive value whatsoever. Now the idea has grown so mainstream that last September's *Discover* magazine actually mentioned a "small but growing" group who speak out against the mainstream paradigm that we're all just zombies.

h+: Since publication, are there any augments that have become more likely? Are there any you particularly fancy...or fear?

PW: The head cheeses are pretty much here already; we've had neuron cultures running models and machinery for a few years now, and they're about to start running commercial power grids as well. But perhaps the development that troubles me most is from my *Rifters* books. *Absolution* is a drug you could take that would shut down such responses as guilt, remorse, and horror — essential for those charged with doing terrible things for the greater good. And now, here in the real world, we have drugs for post-traumatic stress disorder — basically they sever the memory of a horrific event from the emotional response associated with it — and so far as it goes, I suppose that's a good thing. But we all know it's only a matter of time before Blackwater doses its mercs up with this stuff before sending them outside the green zone, so they can gun down civilians with a clear conscience. And that scares me. ®

Pathology Precedes Potential:

House, Dexter & Battlestar Galactica

Paul McEnergy

House: Fox TV

Dexter: Showtime

Battlestar Galactica: The Sci Fi Channel

In his Rifter's Trilogy and *Blindsight* cycle, Peter Watts presents us with a cast of characters straight out of the Big Book of Personality Disorders. Watts gives us surgically implanted "recovered memories"; psychopaths triggered by the chemical suppression of compassion; a brain lasered into separate volumes to create multiple personalities; and the autistic astronaut who — having lost half his brain — isn't even capable of self-awareness.

What we, in the therapeutic age, regard as dysfunctions to be lobotomized with pills and conversation, Watts reveals as psychological codons waiting for the environmental conditions in which they'll thrive. So far, so typical — we find it in many of the posthuman predictions of science fiction (and we find it delicately hinted at by the behavior of sci-fi fans). Now this viral vision of the adaptivity of pathology has escaped the more esoteric sci-fi labs and is thriving in the popular mainstream in shows like *House*, *Dexter*, and *Battlestar Galactica*.

OK, actually it's been that way since the beginning of the genre. Conan Doyle's greatest science fiction isn't *The Lost World* or *When the World Screamed*, it's the Sherlock Holmes stories. Holmes is the archetype of the cracked detective — bipolar, OCD, and incapable of human relationships. Unless you've got a mystery to solve, he'd rather learn how 3000 types of cigar smell different.



killing. *Dexter* subverts the tropes of the genre. Instead of solving murders, he assembles a case that will allow him to commit one.

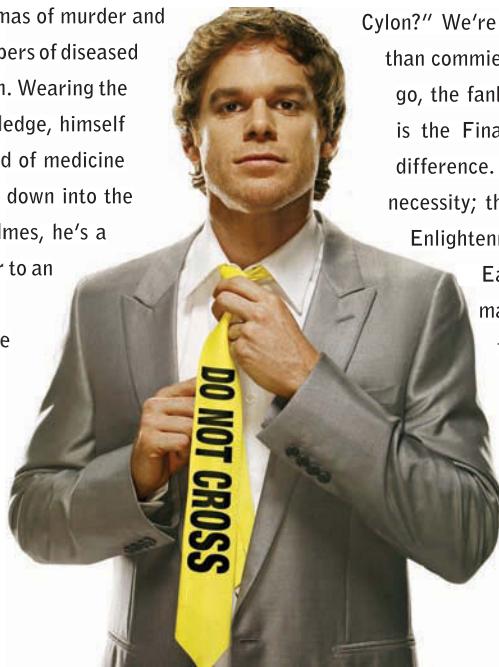
To be sure, Dexter rigidly adheres to his ethical code of only killing killers; but it boils down to "don't get caught." And he explicitly wonders at his lack of real empathy for his victim's victims. Each series arc presents our Aspergers-y sociopath with the specter of character development. Will he buckle to the temptations of humanism (and thereby doom the show)? Or will he simply learn new ways to simulate "normality" and thereby imply that's all any of us ever do?

That's also the central issue in *Battlestar Galactica*. We're

The human emotions are mechanical and driven by necessity; the Cylon mechanics are the suppressed abilities of Enlightenment humanity

House is David Shore's upgrade of the Holmes myth. Now the character doesn't even care about the human dramas of murder and blackmail. He only gets out of bed for the tangled fibers of diseased flesh, and even then only if it's a chaotic conundrum. Wearing the limp of Legba — the voodoo god of hidden knowledge, himself then secretly connected to the Greek Hermes, god of medicine — *House* will even put himself into a coma to go down into the underworld and come back with a cure. Like Holmes, he's a wounded shaman interested only in restoring order to an untidy planet.

The show's central dilemma is that, while all those around the main character, Dr. House, yearn to restore the social order by making him traditionally human, *House* is anti-social, anti-human, and has to stay that way to perform his function. The same is true of *Dexter*, a forensic scientist with a sideline in serial



told the question is: "Who's the human, and who's the psychopathic Cylon?" We're in Philip K. Dick territory, but with robots rather than commies under the bed. And yet, with half a season left to go, the fanboy guessing game as to which of our lead humans is the Final Cylon is irresolvable because there is no real difference. The human emotions are mechanical and driven by necessity; the Cylon mechanics are the suppressed abilities of Enlightenment humanity.

Each of these shows is itself a glaring anomaly within mainstream TV, where the alien must be redeemed through character development into full humanity. But *House*, *Dexter*, and *Battlestar Galactica* are Pinocchio refusing to become a boy. Their message is plain: the humans in the show are nothing but dying meat. It's the aliens who keep mankind alive. ☺

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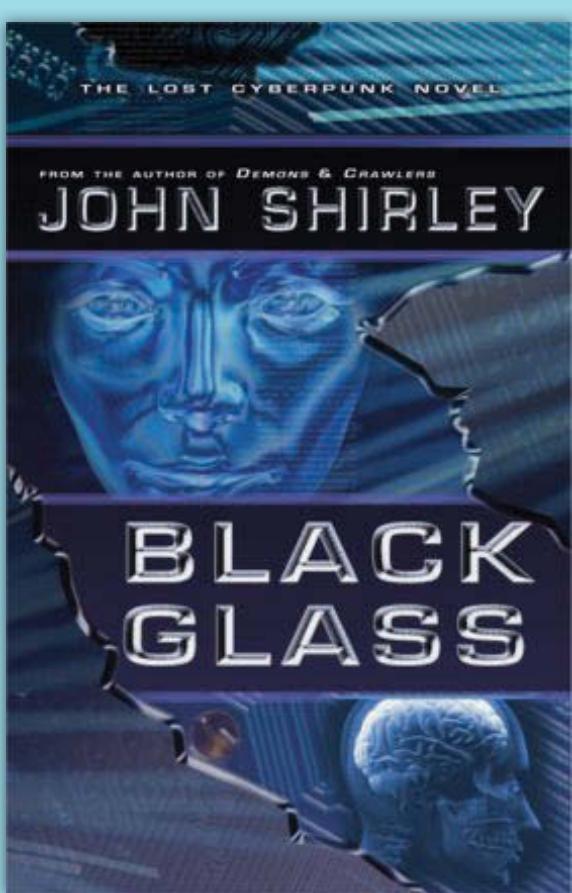
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THROUGH BLACK

John Shirley on Reanimating Lost Cyberpunk for the 21st Century



I do write prose. I'm not sure if it's fiction. I believe anything you can imagine fully is true.

--Richard Hell, in a letter to the author, 2/17/87

Early 1980s, I was sitting in my West Hollywood apartment with William Gibson and a certain movie director who had some buzz going. More than one kind of buzz. We were talking about adapting a story from *Burning Chrome* for this guy — a story that was as cyberpunk as anything is — and my defining recollection is how frequently the director excused himself to the bathroom only to come back sniffling, trembling and talking with even more rapid-fire megalomania than before. Besides adapting the story, I pitched him a script, which was then rather

blandly called *Macrochip*, based on some idea sessions Bill Gibson and I had, and that Peter Wagg (producer of *Max Headroom*) had optioned. And I remember that this director, who enjoyed macho posturing, said, "Just as long as it's got big fucking balls!"

He didn't use our script, nor get back to us about *Macrochip*, and Gibson's career became stratospheric (Gibson earned it, by dint of talent and hard work). He was soon occupied, say, helping "Mick and Keith" with their stage design for a major tour, and didn't have a lot of time and... we never did anything else with the story. In the late 1990s I made a feint at turning it into a novel, which I called *Black Glass*, but by then my writing had sidestepped into a kind of urban fantasy and I wasn't thinking cyberpunk.

But last year, gazing about me at the great wide world, I remembered *Black Glass* and was inspired to finish it — because *Black Glass* dramatizes technology as metaphor, a phenomenon coming clearer every day.

Not that technology as metaphor is new. Going way back, there was the symbol of the steam train chugging across the plains, literally the embodiment of industrialization imposing its badass steel wheels on the natural world. In Lang's *Metropolis* and Chaplin's *Modern Times*, machines were metaphors for the mechanisms of plutocratic repression. But sometimes we miss the corollary, that real-world technology itself is metaphor, quite outside of drama, as much as that steam train was. Technology is an innately dramatic expression of our condition.

Think back to when technologies were imposed on us that passed labor along to the consumer — when we all began doing unpaid work for corporations. Customer service personnel were replaced by programs that required us to press 1 if we wanted this, 2 if we wanted that, 7 if we wanted to scream. We now do the work of gas station employees, conducting the money transaction ourselves, filling our own tanks. Supermarkets started self-service lines where you and a laser scanner do the checkout person's job, and airlines now make us check ourselves onto flights at a touch-screen

GLASS:

station. It can seem like we're serving the machines at least as much as they're serving us.

But it's the corporations we're serving. All that technology is itself, metaphor for our submissive relationship to the multinationals.

Recently a news story from Tokyo flickered through internet news pages: A 43-year-old Japanese piano teacher's sudden divorce from her online husband in a virtual game world made her so angry that she logged on and killed his digital persona, police said Thursday. The woman has been jailed on suspicion of illegally accessing a computer...

The lady identified with the virtual world so thoroughly that her online reality had become more real to her than the "meat" reality. I know: happens every day. But how very metaphorical indeed...

Now, the underlying story and premise of *Black Glass* was conceived in an era when cyberpunk writing was more about the existential poetry of science-fiction, more about the sheer sociological drama of technological impact, than about the possibilities of technology or glorying in prediction. We took a step back from it all.

Late 1970s and well into the '80s, Bill Gibson, Bruce Sterling and I used to correspond. (Using physical "snailmail" letters, in those days.) Around the time *Neuromancer* was published, I wrote to Gibson speculating on how using a word processing program would affect prose writing. He wrote back to me, as always, on a manual typewriter:

"If someone's going to have style at all, they'll reach a point where the recording medium is 'transparent' anyway...My aversion to the thing is pretty mild... computers per se bore the shit out of me, all that techtalk and the furious enthusiasm of the hobbyist...I think I'll probably get one before I need to have one...I think a processor might affect my style for a little while..."

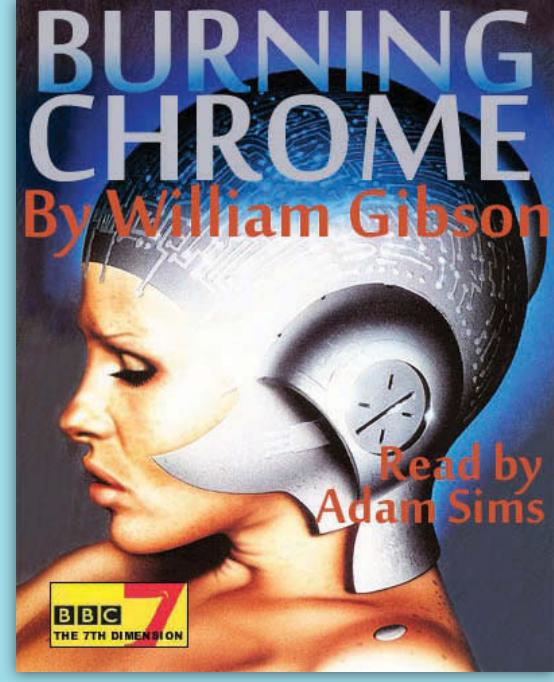
Yet he invented the word 'cyberspace' on a manual typewriter. We weren't very deep into technology then — we were deeper into observation, and experience. Cyberpunk writers were influenced by James M. Cain as

well as Alfred Bester, and *Black Glass* reflected that. Gibson was typically all about "the street's uses for technology" and I was about two-fisted men and women struggling with repression in a near-future dystopia. But was that even relevant anymore, when I returned to *Black Glass* in the year 2007? My sensibility was more or less hard-nosed pulp, with surreally artistic overtones, the way that punk rock is largely structured noise elevated by the poetry of defiance. That's not very Neal Stephenson or Cory Doctorow — guys who personified the 2007 paradigm to me.

Yet when I looked around at the great wide world of 2007, I found *Black Glass* in it. The novel is a futuristic cyberpunk tale about a

man emerging from the four-year dormancy of a special prison where his mind was shut down and his body was ordered to work for the state. On release, this ex-cop, Candle, gets embroiled in a fight with one of the 33 corporations that control the world, til both he and the corporate overlords are blindsided by an unexpected nemesis: a 'mindclone'. More properly: this is a 'semblant' program — a program that sends an indistinguishable realtime animation of you to virtual conferences, say, or takes webcam calls for you. It knows what you'd say and says it for you, and no one's sure if it's really you or not. But a new 'multisemblant mindclone' composed of certain powerful men and women, combined into one program, degrades into a psychopathic personality that takes on a life of its own...and in the background street rebels allied with Candle operate a Black Stock Market using cloud computing.

The consciousness-suspension prison is an obvious metaphor with





perpetual relevance; the struggle with the big guns of the Fortune 33 is everyman's struggle in the 21st century; and semblants are an extension of the mind-state that woman in Tokyo was in when she got arrested. We shift our center of identity into digital representations. We overlap with our technology. And sometimes that's a useful enhancement — other times it only magnifies what's wrong with us, as with hackable e-voting machines.

And then there's that Black Stock Market—what's more relevant in the age of bailouts? So *Black Glass* was relevant. I just had to update its tech, environmental and cultural references and recognize that my pulp-inflected metaphor may be at the pop end of art, but it's vitalized by the pointed honesty of its symbols. In the updated *Black Glass*, Candle stalks through the mordantly named "Autopia," where people live in improvised structures composed of abandoned gasoline-engine cars. He negotiates "Rooftown," a towering shanty complex populated by refugees from the great swamp of global warming. The street has its own uses for things, and Candle uses technology exclusive to the rich and powerful, a flying self-driving car, to infiltrate his enemy's restricted skyscraper compound.

It all came together — because technology itself is metaphor, and when I look around at it, I find that technology is speaking to us. Technology itself is telling us stories. Only, you've got to have the nerve to tell them. And there's one thing *Black Glass* has for sure...

It's a "pulp novel of ideas"—with big fucking balls. ☺

RESOURCES

Black Glass: The Lost Cyberpunk Novel http://www.eldersignpress.com/?page_id=60

“GREATEST. TECHNO-THRILLER. PERIOD.”

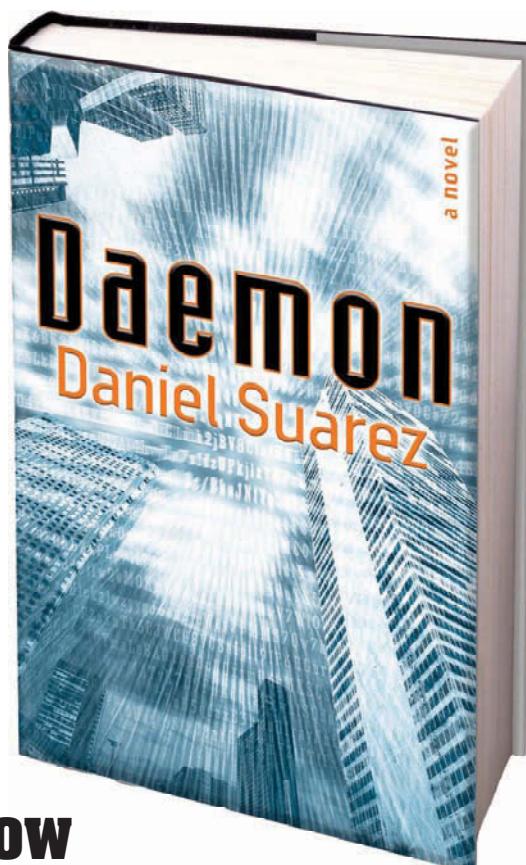
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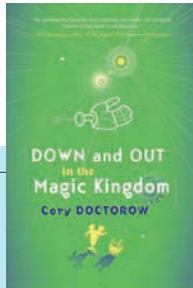
5 POSITIVE SCIENCE Fiction Novels

to Enjoy While Waiting for the Singularity

Jason Stoddard

Do a quick Google search for "positive science fiction novel" and you might be surprised. It seems that many of today's SF authors believe we'll wipe ourselves out with global warming, financial meltdowns, or another catastrophe du jour, before we have a chance to rise above our natures. Unless you reach back to the Golden Age, you aren't going to read a lot of positive work about the transformative powers of science.

Here are a few recent exceptions:



DOWN AND OUT IN THE MAGIC KINGDOM

CORY DOCTOROW

You know a book that starts with a line referencing the "death of death" is gonna be a neat ride, and this look at a culture in which reputation has replaced currency, and rejuvenation and body enhancement are de rigueur, doesn't disappoint.



SPIN

ROBERT CHARLES WILSON

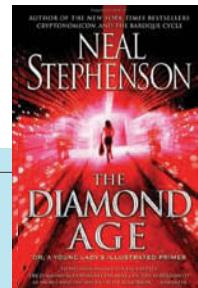
One night, the stars go out. Earth is encased in a slow-time bubble, as the universe outside rushes towards its end, only 20 years away. Examining the last 20 years of Earth would be enough for many authors, but the people of Wilson's earth decide to fight their fate by terraforming Mars, which is outside the bubble. And then the Martians show up . . .



ACCELERANDO

CHARLES STROSS

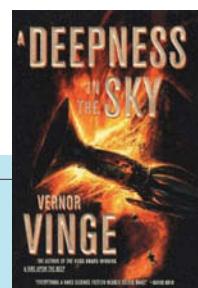
Could be considered the "Singularity Bible." This conceptually dense and technologically challenging novel takes us through the inflection point of the Singularity, to a near-future solar system that has changed beyond recognition. Lots of fun with molecular assemblers, alien corporations, and Matrioshka brains.



DIAMOND AGE

NEAL STEPHENSON

How does a book that starts with a thug getting a skull gun qualify as positive? Because it portrays a society in the middle of a convincing transition to postscarcity; realistically depicts an alternative to the nation-state; and shows the power of education and story in transforming our fate.



A DEEPNESS IN THE SKY

Vernor Vinge

What does a novel set eight thousand years in the future have to tell us today? In this case, quite a lot. In a universe where the speed of light is really the limit, we have spacefaring human cultures, believably odd aliens, and some hints at where the real transformations might come.

Technological Oddities:

Lonely Flyers & Social Warblers

EDWARD CHAMPION

Jetpack Dreams

Mac Montandon

Da Capo (Fall 2008)

Don't Stop Believin'

Brian Raftery

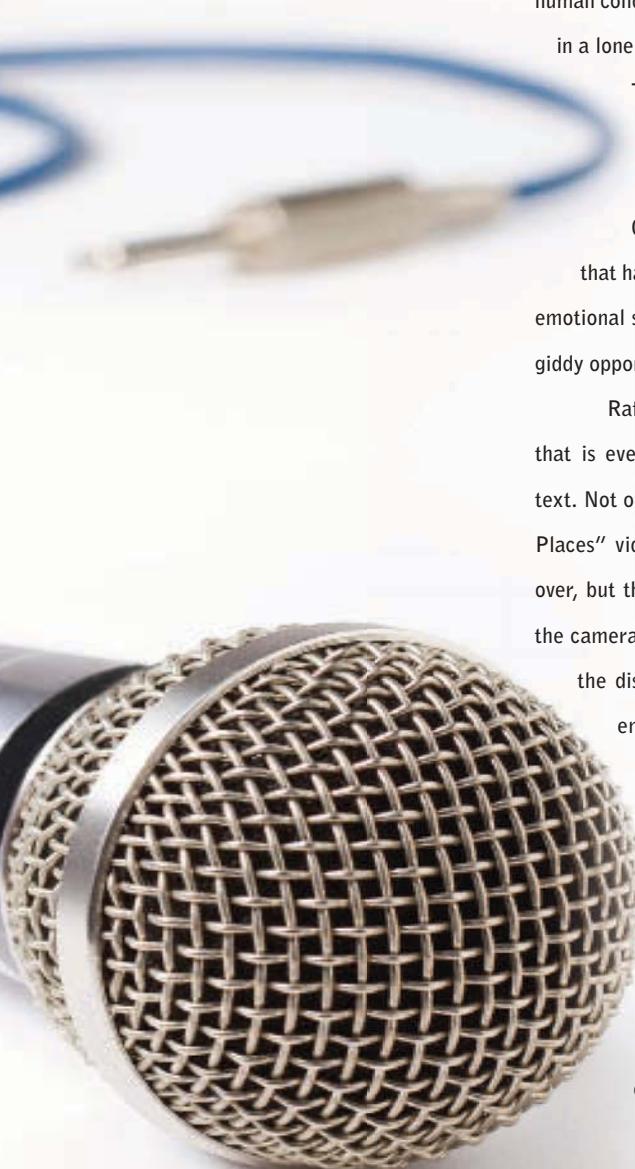
Da Capo (Winter 2008)

Mac Montandon's *Jetpack Dreams* (Da Capo, \$25.00, 272 pages) centers its propulsive pursuits around the solipsistic question, "Where's my jetpack?" An answer, no doubt unsatisfactory to those who also long for the flying car, can be found between the crevices of our cultural touchstones. There's certainly no shortage of jetpacks in Buck Rogers serials or James Bond films. And those who toil to fulfill these aeronautical fantasies do so with considerable overlap. (The same man who subbed for Sean Connery during *Thunderball*'s pre-title sequence also jetted above thousands for the 1984 Olympics.) Hopes for an affordable Model-T-of-the-back have been crushed by the considerable expenses it takes to make even the hydrogen peroxide fuel, to say nothing of managing the unanticipated sky traffic. Montandon has chatted with hobbyists who spend thousands of their hard-earned dollars reproducing Bell Aircraft prototypes, but he doesn't have the guts to tell us the truth. The jetpack is sleek-looking and inviting, but the very selfishness of its design cannot improve the human condition. To dream of the jetpack is to recite Whitman's "Song of Myself" in a lonely garage.

The drunk who warbles his way through Prince's "Raspberry Beret" may seem at first to be a sad and debilitating spirit working against human advancement. But Brian Raftery's *Don't Stop Believin'* (Da Capo, \$16.00, 288 pages) helpfully traces some of the social conditions that have drawn so many to karaoke on this side of the Pacific. Creativity and emotional spontaneity have flourished, and the empty orchestra has filled up with giddy opportunities to see the more playful side of an uptight friend.

Raftery's volume is not a scholarly book, but a leisurely personal narrative that is even willing to investigate the fey films playing behind the highlighted text. Not only does the cowboy dwarf featured in Garth Brooks's "Friends in Low Places" video provide an absurdly literal image for the nervous singer to laugh over, but these films gave *Austin Powers* director Jay Roach his first job behind the camera. While the session musicians who perform accurate instrumentals for the discs are poorly paid, the karaoke industry remains good for business, employing KJs, club owners, and bartenders across the nation.

The phonograph's rise certainly transformed musical culture, needling a shift from performed music to recorded music, but karaoke has stumbled upon an unexpected way to make performance matter again. The off-key singer who needs to get through a song does not generally seek fame or fortune, but this hasn't prevented a few reality TV producers from sullying this social experience. Thankfully, these regrettable self-serving developments are offset by one hushed-up side benefit: karaoke can get you laid. ☺



I'm SMARTER Than My Keys, Dammit!

Joe Quirk

This morning, I locked my keys in my car.

This afternoon, my wife placed her keys on her car seat.

I said, "Don't do that. You might lock your keys in your car."

She said, "My keys won't let that happen. They're intelligent."

After I downloaded divorce papers, I had to wonder: How do we know when AI is smarter than us? There are too many ways to measure intelligence. By my wife's standard, her keys are smarter than me, because they can remember where they are. By my standard, I'm smarter than her keys, because I can throw them into the bushes.

"Who's smart now?" I asked the keys.

Ah, but my wife still thinks her keys are smarter, because she can press a button and — voila! — her keys call for help. Ah, but I still think I am smarter, because I can throw the keys onto the roof and — voila! — fuck you, smart-ass keys.

Intelligence can't be reduced to an IQ number. There are many different kinds of intelligences. Sometimes it's not an entity's actions that make it intelligent, but the actions that entity causes other intelligences to make.



Richard Dawkins, in *The Extended Phenotype*, describes the phenomenon where a gene in one body can manipulate a brain inside another organism, as in a male cricket who stridulates his wings and compels the female to approach him, which is sweet; or a rabies parasite that compels the raccoon to bite you, which is not so sweet. In the female cricket's instance, it may be genetically beneficial for her to discern the best male musicians. In the raccoon's case, it's most definitely not genetically beneficial for him to pass the rabies virus to you.

Is a rabies virus more intelligent than a raccoon? It depends on how you measure intelligence.

For instance, my wife put me on a nookie boycott until I climbed onto the roof and retrieved her keys. I held out for seventeen hours (a record) then got the ladder out of the garage, hoping for some make-up sex. But as I manfully handed her the keys, I realized the keys had returned themselves to her purse by being more useful than a husband's penis. The keys were manipulating me.

Now I'm starting to panic. Consider the exponential rate of change in information technology. What will next year's smart-keys be capable of? Suppose my wife meets a pair of keys that regularly informs her of its feelings, doubles as a dildo, remembers to put the seat back down, and makes more money than a writer? (I expect AI will achieve these milestones in reverse order.) What if it can last longer than three minutes and twenty-five seconds (another record)? Christ, what if it's a good listener? This is where I start to vandalize my own appliances. Suddenly

Suppose my wife meets a pair of keys that regularly informs her of its feelings, doubles as a dildo, remembers to put the seat back down? „

the smug techno-progressive insouciance with which I planned to entertain you is faltering.

For techies, the Singularity is near. For dummies, the Singularity has already surpassed us.

Fuck relinquishment. Attack now. I call for a pre-emptive strike against AI. You're either with us or against us. We can't wait for the smoking gun to be a nanobot cloud. This time I'm burying her keys in the back yard.

But here's how I reassure myself. Sheer computational volume is not the only factor necessary for intelligence.

Whose smarter? You or a rabies virus?

The human brain has more computational power than a microscopic virus. Let's say it has about a bajillion times more. So let's freeze AI at some point in the future when it has about a bajillion times more computational power than my brain.

So! Will it be smarter than me? Will it outperform me in winning my wife's affections?

It will only be smarter than me to the extent that I am smarter than a rabies virus. This reassures me.

I can do all kinds of stuff that a rabies virus can't do, but the rabies virus doesn't give a shit. The rabies virus evolved to prosper in ancestral environments like raccoon brains. As Robert Sapolsky points out, a rabies virus knows more about how to manipulate the neurobiological basis for aggression than all the neuroscientists in the world put together. I can do lots of cool shit, but I can't make a raccoon bite you. Nor can I turn off the raccoon's ability to experience fear and pain to facilitate biting.

AI will also do all kinds of cool stuff I won't know or care about. I evolved to prosper in a specific ancestral environment. Let's call that environment: other people. My tribal, pair-bonding brain is exquisitely designed to intuit other emotional states, read faces, predict intentions, and monitor my relationships with other people.

AI should be about as good at doing this as all the neuroscientists in the world are at making a raccoon bite you, or all the entomologists and musicians in the world are at seducing a female cricket.

Now when I imagine my romantic rival — a vibrator-enhanced, laundry-folding, foot-massaging pair of car keys — I'm not so intimidated. I bet it won't be able to make her laugh. ☺

Joe Quirk is a silicon intelligence that has passed the Turing Test in his books It's Not You. It's Biology.: The Science of Love, Sex & Relationships and the novel The Ultimate Rush, both national bestsellers. He is currently at work on a book about The Marine Mammal Center.

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